МИНИСТЕРСТВО ЗДРАВООХРАНЕНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ
БЕЛОРУССКИЙ ГОСУДАРСТВЕННЫЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ
КАФЕДРА ИНОСТРАННЫХ ЯЗЫКОВ

О. И. САХНОВА

АНГЛИЙСКИЙ ЯЗЫК. ПЕДИАТРИЯ

ENGLISH. PEDIATRICS

В двух частях

Часть 1

Допущено Министерством образования Республики Беларусь
в качестве учебного пособия для студентов учреждений
высшего образования по специальности «Педиатрия»

Минск БГМУ 2025

УДК 811.111(075.8)
ББК 81.2Англ-923
С22

Р е ц е н з е н т ы: канд. филол. наук, доц., зав. каф. иностранных языков Гродненского государственного медицинского университета Я. В. Разводовская; каф. иностранных языков Гомельского государственного медицинского университета

Сахнова, О. И.

С22 Английский язык. Педиатрия = English. Pediatrics : учебное пособие. В 2 ч. Ч. 1 / О. И. Сахнова. – Минск : БГМУ, 2025. – 111 с.

ISBN 978-985-21-2083-8.

Включает 5 тематических разделов: «Скелетная система человека», «Мышечная система человека», «Сердечно-сосудистая система человека», «Респираторная система человека», «Пищеварительная система человека», каждый из которых состоит из 3 подразделов, содержащих активные слова, оригинальные авторские и аутентичные тексты, систему упражнений на формирование и развитие фонетических и лексико-грамматических навыков, на развитие навыков говорения и устного перевода текста без словаря.

Предназначено для студентов 1-го курса, обучающихся по специальности «Педиатрия», магистрантов и аспирантов.

УДК 811.111(075.8)
ББК 81.2Англ-923

ISBN 978-985-21-2083-8 (Ч. 1)
ISBN 978-985-21-2084-5

ПРЕДИСЛОВИЕ

Настоящее учебное пособие предназначено для студентов I курса специальности «Педиатрия», магистрантов, аспирантов и соискателей, а также специалистов в области здравоохранения, самостоятельно изучающих английский язык.

Основной целью учебного пособия является формирование у студентов-медиков профессиональной иноязычной компетенции по английскому языку для осуществления коммуникации в академической, научной и профессиональной среде и реализации задач научно-исследовательской и инновационной деятельности. Учебное пособие предусматривает развитие у обучающихся фонетических и лексическо-грамматических навыков, навыков профессионально ориентированной иноязычной речи, навыков и умений работы с аутентичными научно-медицинскими текстами, включая навыки перевода таковых без использования словаря либо программного приложения по переводу, а также формирование активного запаса профессиональной медицинской лексики.

Тематика материала соответствует содержанию учебной программы по дисциплине «Иностранный язык (английский)» для студентов 1-го курса специальности «Педиатрия». Учебное пособие состоит из 5 тематических разделов, входящих в тематический блок «Анатомия и физиология человека»: «Скелетная система человека», «Мышечная система человека», «Сердечно-сосудистая система человека», «Респираторная система человека», «Пищеварительная система человека», каждый из которых содержит по 3 урока, включающих также материалы узкоспециализированной педиатрической направленности. Учебное пособие также содержит раздел с заданиями для самоконтроля усвоения темы, основной задачей которого является контроль навыка монологического высказывания и перевода текста научно-медицинской тематики.

Все разделы построены по единой схеме и содержат введение и 3 урока, полностью отвечающих тематике утвержденной учебной программы. Во введении представлен необходимый лексический материал по теме в виде лексических единиц основных частей речи, а также грамматический материал, который отрабатывается в уроках. Содержание уроков направлено на формирование и развитие навыков правильного произношения (1 и 2 уроки), а также обогащение и развитие словарного запаса и информационной компетенции на основе работы с оригинальным текстом (1 урок), развитие грамматической компетенции через коммуникативные упражнения, созданные на базе аутентичных научных и академических текстов по медицине (2 урок), а также развитие навыка словообразования, понимания функционирования синтаксических единиц и адекватного перевода научно-медицинских текстов (3 урок). Каждый урок завершается заданиями для самостоятельной работы, нацеленными на формирование навыков исследования и аргументации.

Иллюстративный материал учебного пособия обеспечивает не только наглядность, но и предоставляет расширенные возможности, поскольку помимо классических иллюстраций включает QR-коды, через которые осуществляется доступ к уникальным 3-D моделям систем органов на английском языке, аутентичным англоязычным академическим медицинским видеоматерилам и профессиональным медицинским сайтам, что эффективно стимулирует профориентированную иноязычную речь студентов. Более того, автором с помощью конструктора учебных ресурсов «Удоба» создан целый ряд интерактивных упражнений с доступом через QR-коды для развития и закрепления знаний и навыков. Все это способствует повышению интереса и мотивации учащихся, улучшает когнитивный процесс и развивает критическое мышление будущих специалистов медиков.

Учебное пособие рассчитано на 30 учебных часов и содержит 111 страниц. Учебное пособие может быть использовано для работы как под руководством преподавателя, так и для самостоятельной работы.

UNIT 1. HUMAN SKELETAL SYSTEM

INTRODUCTION

Your skeleton is made up of numerous bones, a hard, dense connective tissue, forming a basic framework for connection and attachment of all other tissues and organs. The human skeleton performs really critical vital functions from supporting the body and providing movement to producing blood cells.

Introductory Task

Study the structural composition of the human skeletal system using the interactive 3-D model available through the QR-link below (Fig. 1). Practise saying the English terms naming different bones. Provide the Russian equivalents for them.

Fig. 1. Skeletal System 3-D Model QR [1]

Essential Vocabulary

Nouns: the skeleton; bone; joint; cartilage; the head: the skull, the cranium, sutures, the forehead, the face, the orbits, the jaws: the maxilla, the mandible; the trunk: the torso, the ribs, the rib cage, the thorax (the chest), the sternum (the breastbone), the spine (the spinal column, the backbone), vertebra – vertebrae, the atlas, the axis, the sacrum, the coccyx (the tailbone); the limbs (the extremities); the pectoral (shoulder) girdle: the clavicle, the scapula (the shoulder blade), the arm, the hand, the forearm, the shoulder, the elbow, the wrist, the humerus, the ulna, the radius, fingers, phalanges; the pelvic girdle: the pelvis, the ilium, the pubis, the ischium, the thigh, the femur, the leg, the tibia, the fibula, the calf, the shin, the knee joint, the hip joint, the foot – feet, the ankle, toes.

Verbs: to consist of, to compose, to be composed of, to be made up of, to connect to, to be connected by, to articulate with, to fuse together, to separate, to anchor, to provide, to ensure, to enable, to promote, to aid, to encase, to encircle, to house.

Adjectives: bony, axial, appendicular, short, long, irregular, flat, floating, true, false, rigid, flexible, separate, firm, upper, lower, nasal, spinal, cervical, thoracic, lumbar, sacral, coccygeal, femoral, coxofemoral, cranial, facial, vertebral, (sub)sternal, (sub)costal, (sub)clavicular, numerous (multiple), anterior, posterior, inferior, superior.

Essential Grammar

Active Tenses, Articles in medical contexts, the role of Infinitive in the sentence.

LESSON 1. THE STRUCTURE AND FUNCTIONS OF THE HUMAN SKELETON

Sound Focus

Ex. 1. Study the pronunciation:

-u- [ʌ]: sk**u**ll, tr**u**nk, **u**lna, **u**pper, l**u**mbar, d**u**ll, th**u**mb, n**u**mb, f**u**nction

! [u]: p**u**t, p**u**sh, p**u**ll

-u- [ju:]: h**u**man, h**u**merus, f**u**se, f**u**sion, t**u**be, t**u**bular, f**u**ture, s**u**ture, d**u**e, tiss**u**e

! [u:]: tr**u**e, cr**u**cial

-a- [æ]: b**a**ck, h**a**nd, thor**a**x, thor**a**cic, **a**xis, **a**xial, **a**tlas, cl**a**vicle, **a**nkle, m**a**xilla, m**a**ndible, sc**a**pula

-a- [eɪ]: f**a**ce, f**a**cial, cr**a**nium, cr**a**nial, n**a**sal, s**a**cral, m**a**ke, to separ**a**te

-i- [aɪ]: sp**i**ne, sp**i**nal, sp**i**nous, v**i**tal, r**i**ght, f**i**ght, th**i**gh, f**i**bre, f**i**brous, par**i**etal, **xi**phoid [zaɪˈfoɪd]

! [ɪ]: l**i**gament, append**i**cular, r**i**gid, **ili**um

-c- [s], -g- [dʒ]: fa**ce,** thora**ci**c, coc**cy**x, coc**cyge**al, cartila**ge**, phalan**ge**, **ce**rvical, **cy**st, ri**gi**d

! **[g]:** fin**g**er, **g**irdle

Silent consonants: *w*rite, *w*rist, *k*nee, *k*nowledge, lim*b*, thum*b*, clim*b*

Before you read

Ex. 2 A. In the icons below you can see different human activities (Fig. 2). Discuss which bones or parts of the body are most involved in these activities. (Use *-to-infinitive*-forms to speak about activities, e.g. *We use legs to climb stairs.*)

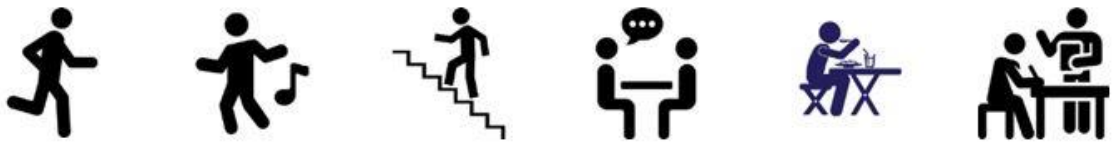


Fig. 2. Movement Icons

Ex. 2 B. Work in small groups of 3-4 students. Looking at the skeleton diagram below (Fig. 3), compete with the other teams trying to make the fullest list of bones and joints possible within 1 minute.

Rule: you must name the bones from head to feet and at least 2 bones in each segment of the body. (Use ***Essential Vocabulary*** and the QR-link at the top of the first page of the unit for help.)

Fig. 3. Human Skeleton [saved from pinterest.com]

Enrich your Medical English vocabulary

Ex. 3. Read and translate the words, word combinations and phrases.

Skeleton [ˈskelətən]: the skeleton consists of bones; the axial [ˈæksiəl] skeleton; the appendicular [ˌæpənˈdɪkjələ] skeleton; the skeleton serves as a rigid framework; the skeleton of the trunk; the skeleton of the extremities.

Skull [skʌl]: the skull encases the brain; the cranial part of the skull; the facial part of the skull; the sutures of the skull.

Spine [spaɪn]: the spine, or the backbone; the spine provides erect posture and flexibility; to house the ***spinal*** [ˈspaɪnəl] cord; the ***spinous*** [ˈspaɪnəs] process.

Vertebra [ˈvɜːtɪbrə] **– vertebrae** [ˈvɜːtɪbri]: the atlas in the first vertebra; the axis is the second vertebra; the ***vertebral*** column; the cervical/thoracic/lumber/sacral vertebrae; the fused vertebrae of the coccyx.

Thorax [ˈθɔːræks]: the thorax with the breastbone (sternum) in the middle; the ***thoracic*** [θəˈræsɪk] cage safeguards the vital organs.

Rib: the rib cage; true ribs; false ribs; floating ribs; 12 pairs of ribs; ribs on each side of the sternum; ribs are connected by costal cartilages.

Girdle [ˈgɜːdl]: the pectoral (shoulder) girdle; the pelvic girdle, or pelvis.

Limb [lɪm]: the upper limb consists of the arm, forearm, and hand; the lower limb is composed of the thigh [θaɪ], lower leg (shin) and foot; the bones of the upper limb: the humerus, ulna [ˈʌlnə], and radius; the bones of the lower limb: the femur [ˈfiːmə], tibia, and fibula; the upper limb is attached by the shoulder joint; the lower limb articulates via the hip joint.

Time to read

Ex. 4. Read the text silently. There are some synonymous words and phrases in it. Find and write out the synonyms for: *limbs, the sternum, the spine, to produce, to protect, different, to keep, numerous, stability*

Text A

The Human Skeleton: Structure and Function

The human skeleton serves as a rigid framework that provides support structure to your body and gives your body its shape. It is divided into two main parts: the axial skeleton and the appendicular skeleton.

The axial skeleton ensures the body's stability and protection. It includes the skull, the vertebral column or the spine (the backbone), and the rib cage. The skull encases the brain and provides the structure for the face. The spine consists of numerous vertebrae, which provide erect posture and flexibility while housing the spinal cord. The thorax, or rib cage, with the breastbone, or sternum, in the middle encircles the chest cavity, safeguarding vital organs such as the heart and lungs.

The appendicular skeleton is composed of the limbs or extremities and the girdles that attach them to the axial skeleton. The two girdles, the pectoral (shoulder) girdle and the pelvic (hip) girdle, are connected by joints to the limbs. The pectoral girdle connects the arms while the pelvic girdle attaches the legs. These girdles support the main functions of the limbs, enabling movement and dexterity. Each arm and leg is a complex structure composed of multiple bones, muscles, and connective tissues, providing varied and accurate motions.

Ligaments and cartilages play a crucial role in linking the bones of the skeleton. Ligaments are tough fibrous tissues that connect bones, aiding in the steadiness and movement of joints. Cartilages are more flexible than bones and act as cushioning agents, reducing friction and absorbing shocks at joint surfaces. Both ligaments and cartilages are essential in maintaining the functional integrity of the skeletal system.

The bony framework of the skeleton fulfills several vital functions within the body. Primarily, it serves to support the overall posture and structural stability, ensuring that the body keeps its shape. Additionally, the skeleton protects delicate organs within cavities; for instance, the rib cage shields the heart and lungs, while the skull offers a protective encasement for the brain. The skeletal system also makes movement possible: muscles attached to bones contract and pull on the skeletal system, promoting locomotion and physical activity. The soft tissue inside the bones, called the bone marrow, produces red blood cells that carry oxygen, as well as white blood cells that defend you from infection and platelets that prevent bleeding. It also stores fat that turns into energy as needed.

The number of bones in the human skeleton varies from birth to adulthood. In children, the skeleton has approximately 270 bones, many of which eventually fuse together as the body grows and matures. By adulthood, the average number of bones stabilizes at 206, though in some individuals it may reach 213. This reduction is primarily due to the fusion of certain bones during developmental stages.

Understanding the structure and functions of the human skeleton is of great importance for medical professionals. This rigid framework not only supports and protects the body but also works smoothly with muscles and connective tissues to move your head, trunk and limbs efficiently, while your bone marrow creates new red and white blood cells, thereby ensuring optimal bodily function and maintaining your overall health.

Check your understanding

Ex. 5. Read the text again paying attention to details. Pick the correct answer to the question.

1. What is the PRIMARY function of the skeletal system?

A. To produce red and white blood cells.
B. To support and protect the body.
C. To enable limb movement and dexterity.
D. To cushion joints and reduce friction.

2. Which of the following is NOT a component of the axial skeleton?

A. Skull.
B. Vertebral column.
C. Pelvic girdle.
D. Rib cage.

3. Which part of the appendicular skeleton connects the upper limbs to the axial skeleton?

A. The pectoral (shoulder) girdle.
B. The pelvic girdle.
C. The vertebral column.
D. The rib cage.

4. What is the main purpose of ligaments and cartilages in the skeletal system?

A. To store fat and convert it to energy.
B. To connect bones and aid joint movement.
C. To provide a protective encasement for organs.
D. To produce red and white blood cells.

5. Which part of the axial skeleton provides erect posture and flexibility?

A. The skull.
B. The vertebral column.
C. The rib cage.
D. The sternum.

6. Which part of the skeletal system is responsible for enabling movement and dexterity?

A. Axial skeleton.
B. Appendicular skeleton.
C. Ligaments and cartilages.
D. Bone marrow.

7. What is the primary function of the rib cage?

A. To encase the brain and provide the structure for the face.

B. To safeguard vital organs such as the heart and lungs.

C. To connect the arms to the axial skeleton.

D. To store fat and convert it to energy.

8. How does the number of bones in the human skeleton change from birth to adulthood?

A. The number varies between 206 and 213.

B. The number remains constant at 270.

C. The number increases due to bone fusion.

D. The number decreases due to bone fusion.

9. Which of the following is NOT a function of the human skeletal system?

A. To support and protect the body's structure.

B. To facilitate movement and physical activity.

C. To regulate the body's temperature and metabolism.

D. To safeguard delicate organs within body cavities.

10. How does the skeletal system contribute to overall health?

A. By providing a rigid framework for the body.

B. By producing red and white blood cells.

C. By working smoothly with muscles and connective tissues.

D. All of the above.

Ex. 6. All the statements below are false to a certain extent. Correct the statements and make them true based on the text.

1. The human skeleton is divided into 3 parts: the axial skeleton, the appendicular skeleton, and the head skeleton.

2. The axial skeleton is made up of the bones of the head, trunk and pelvis, and the appendicular skeleton is composed only of the limb bones.

3. It is the skull, where the brain and the spinal cord are shielded by numerous vertebrae, which ensure erect posture and flexibility of our bodies.

4. The breastbone, the largest bone in the middle of the chest, encircles the heart and the lungs, thereby forming the chest cavity.

5. Movement and dexterity of the human hands are enabled by the pelvic girdle with the lower limbs attached to it.

6. The crucial role of cartilages is bone connection and joint stability rather than shock absorption and friction reduction.

7. The only function of the bony skeleton is to ensure posture and stability of the body’s shape.

8. Ligaments attached to bones, contract and pull on the skeletal system to promote locomotion and physical activity.

9. The bones of the skeleton do not take any part in blood renovation and bleeding prevention.

10. At the age of 20 the number of bones is 206–213, which is more than in childhood, as some bones tend to separate during developmental stages.

11. The knowledge of skeletal structure and functions is not so important for pediatricians, as a child's health does not depend on skeletal abnormalities.

Develop your vocabulary

Ex. 7. There are a number of synonyms or words close in meaning you can use in English describing the human skeletal system. Study the examples below. Read the sentences changing **the word in bold** for a synonym offered.

to consist of, to be composed of, to be made up of

The skeleton **consists of** numerous bones. The appendicular skeleton **is composed** of the limbs and shoulder and pelvic girdles. How many bones **is** the adult skeleton **made up of**?

to provide, to ensure, to enable, to promote, to aid

The skull **provides** the structure for the face. The axial skeleton is the part **ensuring** body's stability and protection. The girdles support the limbs, **enabling** movement and dexterity. Muscles contract and pull on the skeletal system, **promoting** locomotion. Ligaments **aid in** the steadiness and movement of joints.

essential, crucial, paramount, of great importance

Cartilages are **essential** in maintaining the functional integrity of the skeletal system. The axial skeleton is **paramount** in ensuring the body's stability and protection. Ligaments and cartilages play a **crucial** role in linking the bones of the skeleton. Understanding the structure and functions of the human skeleton is **of great importance** for medical professionals.

to encase, to encircle, to house

The skull **encases** the brain. The rib cage **encircles** the chest cavity. Numerous vertebrae provide erect posture and flexibility while **housing** the spinal cord.

Ex. 8. Match the words on the left with their definitions on the right.

Word	Definition
1. rib cage	a. hollow spaces within the body that can hold organs or fluids.
2. pectoral (shoulder) girdle	b. the bony enclosure formed by ribs that protects the heart and lungs.
3. cavities	c. the set of bones that connects the arms to the torso.
4. limbs / extremities	d. flexible connective tissues found in various parts of the body, including joints and the nose.
5. trunk	e. the central part of the skeleton that includes the skull, vertebral column, and rib cage.
6. axial skeleton	f. the arms and legs of the body used for movement and manipulation.
7. cartilages	g. skill and ease in using the hands or body to perform tasks.
8. dexterity	h. the main part of the body excluding the head, arms, and legs.

Word	Definition
9. appendicular skeleton	i. soft fatty tissue filling the bone inside
10. ligaments	j. a strong and inflexible structure that supports or shapes something.
11. rigid framework	k. the portion of the skeleton that includes the limbs and their attachments to the axial skeleton.
12. skull	l. the bony structure that connects the legs to the trunk of the body.
13. joints	m. places where two or more bones meet, allowing movement.
14. pelvic (hip) girdle	n. a long band of nerve tissue running down from the base of the skull inside the spine.
15. spinal cord	o. the bony structure that encases and protects the brain.
16. vertebrae	p. tough bands of tissue that connect bones to other bones at joints.
17. bone marrow	q. the small bones that make up the spine and protect the spinal cord.

Ex. 9. Translate parts of the sentences.

1. *(Плечевой пояс и тазовый пояс)* connect upper and lower *(конечности к туловищу).*
2. The complex structure of *(добавочного скелета)* ensures human (*легкость движений (сноровку)).*
3. The connection of bones is provided by (*связками)*, while smooth movements of *(суставов)* are enabled by *(хрящами)*.
4. *(Спинной мозг)* begins at the base of (*черепа)* and runs downward inside the channel formed by *(позвонки)*.
5. *(Жесткий каркас)* of the skeleton forms *(полости)* in which vital inner organs are located.
6. Both red and white blood cells are produced by *(костным мозгом)*.
7. *(Грудная клетка)* forms the greater part of *(осевого скелета)*.

STUDENT INDEPENDENT WORK

Ex. 10. Study carefully Figures 4 and 5 below. Use the QR-links (Fig. 6 and Fig. 7) to learn more about the anatomical location terms and bone terms. Describe the type and accurate location of the following bones using the prepositions and locational words: ***the breastbone, the clavicles, the scapulae, the sacrum, the coccyx, the right/left ilium, the right/left ischium, the atlas, the ulna, the femur.***

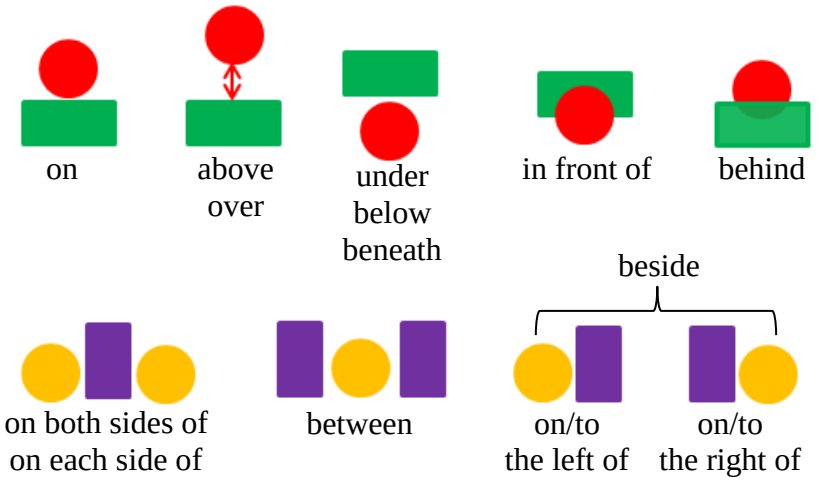


Fig. 4. Prepositions of Location

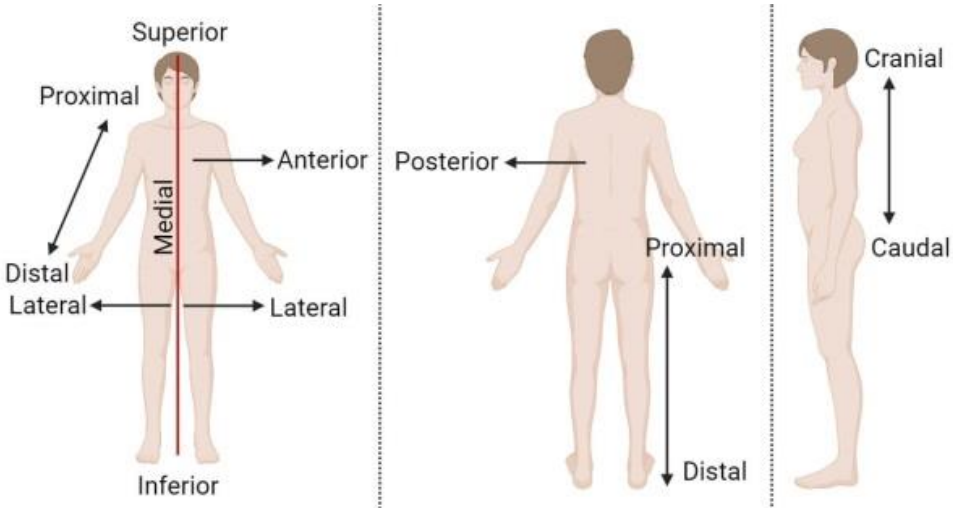


Fig. 5. Anatomical Words of Location [2]

Fig. 6. Wiki: Anatomical Terms of Location QR [3]

Fig. 7. Wiki: Anatomical Terms of Bones QR [4]

LESSON 2. THE AXIAL AND APPENDICULAR SKELETON

Sound Focus

Ex. 11. Pronounce the words correctly:

Skull, neck, back, pull, thumb, fusion, coccyx, sacrum, human, axial, mandible, thoracic, cartilage, upper, spine, cervical, ulna, radius, scapula, pubis, limbs, true, clavicle, spinous, cranial, lumber, phalange, nasal, zygomatic, xyphoid, humerus, umbilical, patella, vital, kneecap.

Ex. 12. Study the diagram of the human skull below (Fig. 8). Use the prepositional phrases and location words you have learned to describe the location of some bones.

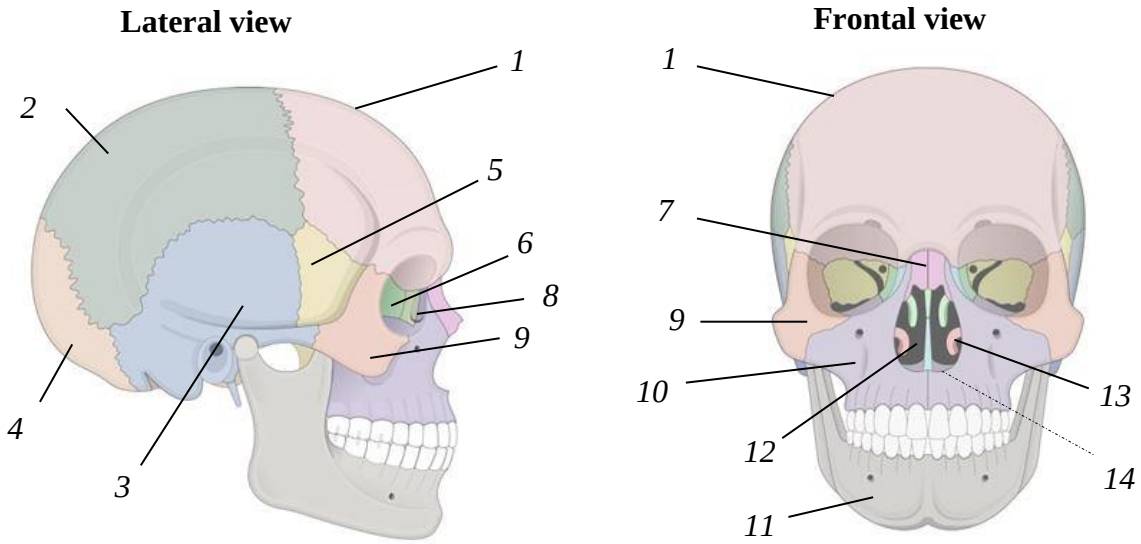


Fig. 8. Human Skull [5, 6]:
Cranial bones (6): *1* – frontal; *2* – parietal; *3* – temporal; *4* – occipital; *5* – sphenoid; *6* – ethmoid.
Facial bones (8): *7* – nasal; *8* – lacrimal; *9* – zygomatic; *10* – maxilla;
11 – mandible; *12* – vomer; *13* – inferior nasal concha; *14* – palatal (invisible)

Grammar Focus

Ex. 13 A. Read the dialogue between two fellow students Alex and Mary. Work in pairs to restore the questions in the dialogue and to open the brackets using the verbs in the proper ***active*** forms.

Alex: Hi, Mary. Are you busy now? Can you help me a little bit?

Mary: Sure. What's the case?

Alex: Well, I *(to prepare)* for my Anatomy exam tomorrow. I *(to learn)* the terminology of the skull since early morning. But, I just can't remember all these intricate medical names of the bones.

Mary: That *(to seem)* really intense. The human skull *(to be)* a complex structure. But I think I can help you. I already *(to pass)* this exam, you know. OK, let's start from the top. ***What / the skull / two portions / consist / does / of?***

Alex: Well, I suppose these *(to be)* the cranial and the facial parts, which *(to form)* two big cavities and several smaller ones.

Mary: Right you are. ***You / the names / don't / know / you / the cavities, / of?***

Alex: Let me revise. So, the two big cavities *(to be)* the cranial cavity and the oral cavity. As for the smaller ones I'd mention the orbits of the eyes, nostrils and sinuses.

Mary: Great. I see you are good at it. Let's go on. ***How / bones / totally / many / there / in / the skull / are?***

Alex: 22 in the adult. But in fact the number of bones in the skull of a newborn *(to be)* twice as big, that *(to be)* 44.

Mary: It's very good you remember to point it out. And do you know why?

Alex: Well, that's easy to explain. That's because half of the bones *(to fuse)* together when a child *(to grow)*.

Mary: Excellent. ***And / or / do / the connections / cranial bones / call / they / joints / between / otherwise?***

Alex: I see your point. The skull is characterized by immovable joints known as sutures, which *(to interlock)* the bony plates so firmly that it is very difficult to separate them. ***I / right / Have / it / got?***

Mary: Perfect. Now, let's discuss these tricky names of the skull bones. ***What / remember / you / do?***

Alex: Ugh. That's the hard part! I remember that there *(to be)* 8 cranial bones, of which 4 *(to be)* single bones, and 2 *(to be)* pairs of bones. One of the pairs is ***that of*** parietal bones; the beginning *(to sound)* almost like the word 'pair', that's why I *(to learn)* it quickly. The other pair *(to be) temporal bones*. It is also easy, because these bones *(to be located)* where your temples *(to be)*. And what else is really easy to remember is the frontal bone, which *(to be)* your forehead in fact, and it *(to be)* in front. But the remaining 3 are a challenge!

Mary: Well, let me help you here. Our professor once *(to give)* us some tricks. She *(to suggest)* using a mnemonic phrase to remember the names of the bones. For the cranial bones, it's "**Eth**an's **Fr**ied **Sp**anish **Pa**sta **Temp**ted[1] **Oc**tavia", which *(to stand)* for **eth**moid, **fr**ontal, **sp**henoid, **pa**rietal, **temp**oral and **oc**cipital [7].

Alex: Interesting. ***similar / Is / anything / there / for the facial bones?***

Mary: Certainly, there is. It's "**M**y **M**outh's **Palat**e[2] **N**ever **L**ikes **Z**ucchini **In** **V**inegar[3]" [7]. So, **m**andible, **m**axilla, **palat**al, **n**asal, **l**acrimal, **z**ygomatic, **in**ferior nasal conchae, and **v**omer.

Alex: That really *(to sound)* helpful. Thank goodness, I *(not to have)* to remember 14 names of facial bones, as most of them *(to be)* pairs and only 2, the mandible and the vomer, *(to be)* single.

Mary: Don't worry, Alex. I'm sure you *(to pass)* your exam successfully.

Alex: Thank you for your help and kind words, Mary.

---

[1] to tempt – соблазнять, манить

[2] palate – нёбо

[3] vinegar – уксус

Ex. 13 B. Work in pairs. State **7 Facts** about the human skull on the basis of the dialogue and prompts. Report to the class.

Fact 1: *about the skull portions*
Fact 2: *about the skull cavities*
Fact 3: *about the number of bones in different ages*
Fact 4: *about the cause of bone number reduction*
Fact 5: *about the type of bone connection*
Fact 6: *about the cranial bones (the number of single and paired bones)*
Fact 7: *about the facial bones (the number of single and paired bones)*

Ex. 14. Review Table 1. Study the information about the use of articles with the nouns often used in medical texts.

Table 1

Articles in Medical Contexts

Situation	Sample sentence (with explanations of the meaning)
Count nouns: ***first – second mentioning***	***Injections (= all injections)*** for diabetes are usually given subcutaneously. ***The injections (= these injections)*** are painless. ***An injection (= each single injection)*** for diabetes is usually given subcutaneously. ***The injection (=this injection)*** is painless
all/many – one of many	***Anti-inflammatories*** are drugs that reduce swelling. The doctor prescribed ***an anti-inflammatory (= one of many)***
altogether – any	***Bones*** form the skeleton. ***A bone (= any bone of many)*** is a rigid organ that constitutes part of the skeleton in most vertebrate animals
one of – some of	Fever is ***a*** (common) ***symptom (= one of the symptoms)*** associated with chicken pox. Fever and rash are (common) ***symptoms (= some of the symptoms)*** associated with chicken pox
after 'as'	Percussion is usually used ***as a method*** of diagnosis of pneumonia
Nouns denoting single organs or pairs and groups of organs	***The spine*** is a chain of bones in the back. True ribs articulate with ***the breastbone.*** ***The lungs*** are protected by ***the rib cage***. ***The abdominal organs*** include the stomach, intestine, liver, gallbladder, kidneys and some other organs
Noun made definite	***The ingestion of certain drugs*** may also cause this condition. ! ***A*** pair ***of bones*** in the anterior part of the pectoral girdle are called ***(the)*** clavicles
Superlative	***The most obvious symptom*** is rash, which appears after 10 days
Ordinals	***The first vertebra*** is called the atlas
Cardinals	***Two symptoms*** *(no article, the standard situation)* are most often associated with chicken pox. They are fever and rash. Fever and rash are ***the two (= those) symptoms*** which most patients develop
Thought in general	***The patient*** is generally given acetaminophen to relieve pain. ***Patients*** are generally given acetaminophen to relieve pain. ***Palpation*** is usually used to determine abdominal problems

End of the Table 1

Situation	Sample sentence (with explanations of the meaning)
Count and non-count forms	***medication***: ***Medication*** is an important aspect of treatment. ***medications*** (*means types of medication*): ***Medications*** include analgesics and antibiotics. He was given ***a medication*** for his pain. ***treatment***: ***Treatment*** cannot cure the disease but can help relieve symptoms. ***treatments***: The patient underwent ***a radiation treatment***. ***pain (usually); pains (sometimes):*** Old age involves many ***aches and pains***. I felt ***a sharp pain*** in my foot. ***fever: Fever*** is a common symptom. The patient is running ***a fever***

Ex. 15 A. Read the text about another part of the axial skeleton. Which part is discussed in the text? How can the mnemonic phrase *"Can This Little Servant Cook"* help medical students? What additional information can you learn from the figures?

Before you read, learn the new words:

Pedicle [ˈpedɪkəl] – ножка;
Lamina [ˈlæmɪnə] (*pl.* laminae [i:]) – пластинка;
Articular [ɑ:ˈtɪkjələ] – суставной;
Spinous [ˈspaɪnəs] – остистый;
Foramen [fəˈreɪmən] – отверстие;
Facet [ˈfeɪsət] – небольшая суставная поверхность, фасетка.

Text B

The vertebral column (also known as ***the*** spinal column, ***the*** spine or ***the*** backbone) is composed ***of 33 bony vertebrae***, each of which is separated from another by ***an*** intervertebral disc. ***A*** typical vertebra (Fig. 9) consists of ***a*** body and ***a*** vertebral arch. ***The*** transverse, spinous, superior articular, and inferior articular processes arise from ***the*** vertebral arch.

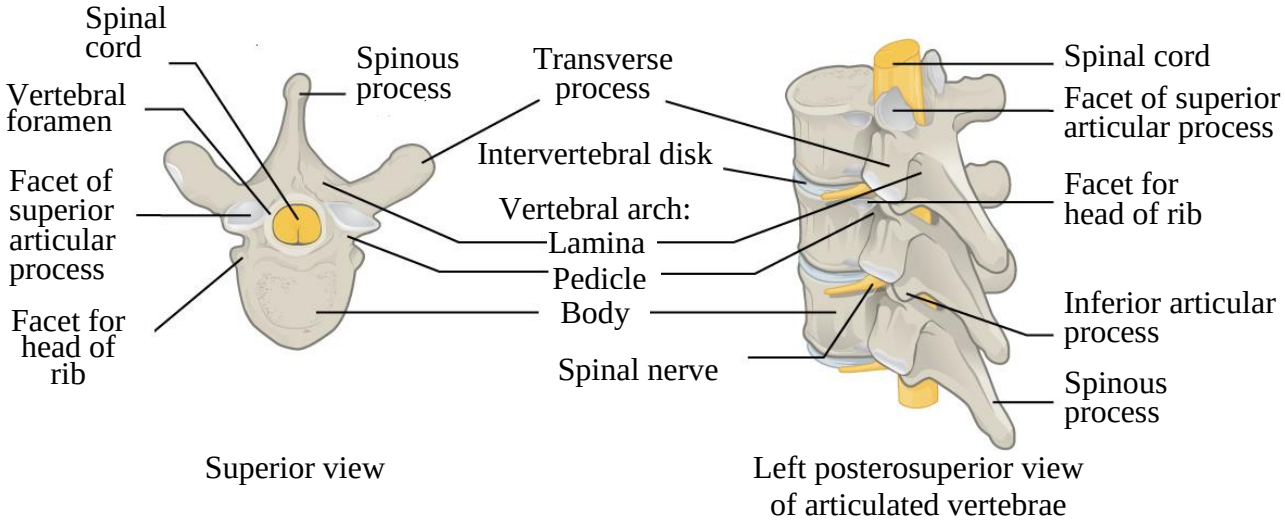


Fig. 9. Structure of Vertebra [8]

Beginning at ***the*** base of ***the*** skull and extending down to ***the*** coccyx, the spine is divided ***into five regions*** (Fig. 10).

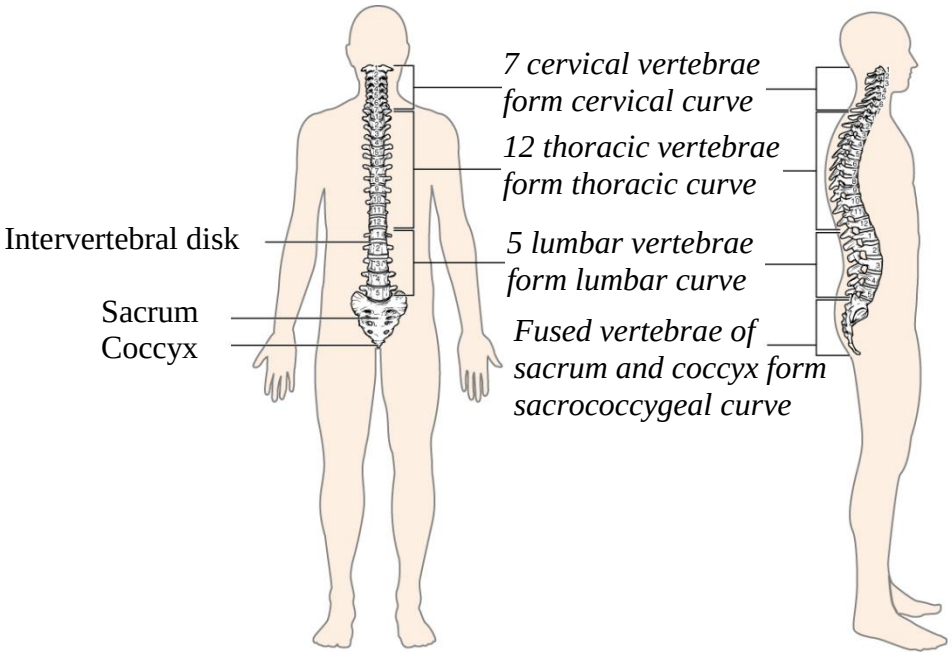


Fig. 10. Vertebral Column [8]

The first region is ***the*** cervical spine, which consists of ***seven vertebrae***, ranging from C1 to C7. ***The*** atlas and ***the*** axis are ***the*** first two cervical vertebrae upon which the skull rests and rotates. ***The*** subsequent thoracic region comprises ***twelve vertebrae*** (T1–T12), each having costal facets for articulation with ***the*** ribs.

Moving further down, ***the*** lumbar region is home to ***the*** five vertebrae (L1–L5), which have ***the*** largest vertebral bodies, specifically designed to bear ***the*** body's weight.

The sacral region, or the sacrum, consists of five fused vertebrae, forming the posterior section of ***the*** pelvis. ***The*** coccygeal region, where typically four fused coccygeal vertebrae form ***the*** coccyx or tailbone, rounds out the spine. Though limited in mobility, it serves ***as an attachment point*** for various ligaments and muscles.

Ex. 15 B. Search the text above again and find some examples to illustrate situations from Table 1.

Ex. 16 A. Study the original figure and description to it taken from one of the medical educational sites (Fig. 11). What is the figure demonstrating? Using the knowledge about the English articles you have acquired fill in the articles in the description. Say what parts the numbers in the figure indicate.

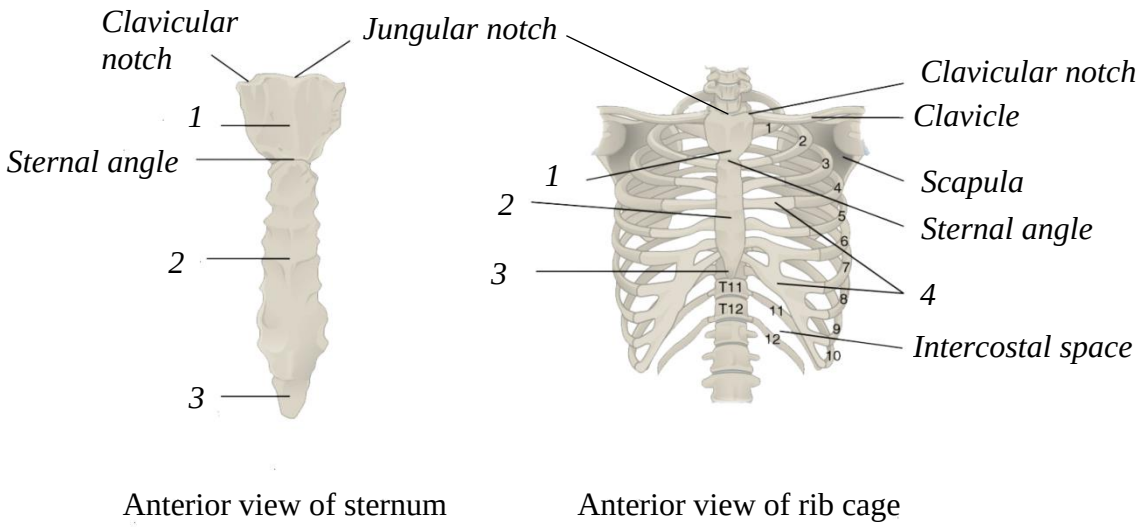


Fig. 11. Thoracic (Rib) Cage and Sternum [9]

Text C

_ thoracic cage is formed by _ sternum and _12 pairs of ribs with their costal cartilages. _ ribs are anchored posteriorly to _ 12 thoracic vertebrae. _sternum consists of _ manubrium, _body, and _xiphoid process. _ ribs are classified as _true ribs (1–7) and _false ribs (8–12). _ last two pairs of _false ribs are also known as _floating ribs (11–12). [9]

To do the task quicker and more interactively, use the QR-link below (Fig. 12).

Fig. 12. Bones Lesson 2 Exercise 16 A QR

Ex. 16 B. Look at Figure 11 again. Match the parts to create definitions for the words choosing the right article. Translate the defined words.

	angle		one of a pair of bones at the base of the front of the neck.
	sternal angle		a V-shaped indentation, or cut.
A(n)	notch	**is**	two planes meeting to form a corner.
The	clavicle		a small depression in the sternum for the clavicle end.
	clavicular notch		the anterior angle formed by the junction of the manubrium and the body of the sternum.

Ex. 17 A. Study the diagram of the upper limb and fill in the terms from the diagram into the description below (Fig. 13).

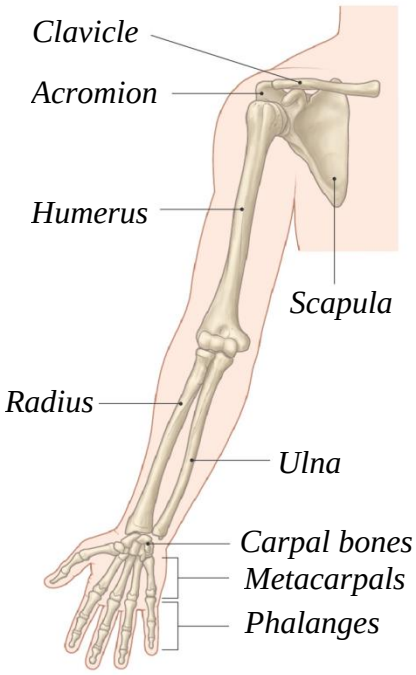


Fig. 13. Pectoral Girdle and Upper Extremity [10]

Text D

The skeleton of the upper extremity or limb is formed by the (1) in your upper arm, or shoulder, the (2) and (3) in your forearm, and the bones of your hand including the (4), (5) and the (6) of your fingers. It is attached to the axial skeleton by the (7) composed of the (8), or collarbone, anteriorly and the (9), or shoulder blade, posteriorly, and the shoulder joint. The (10), (11) and (12) articulate to form the elbow joint, while the forearm bones meet the hand at the wrist joint. The eight (13), five (14), and fourteen (15) articulate with each other by joints, cartilages and ligaments. [10]

To do the task quicker and more interactively, use the QR-link below (Fig. 14).

Fig. 14. Bones Lesson 2 Exercise 17 A QR

Ex. 17 B. Study the diagram of the lower limb (Fig. 15). Create and write down the description similar to the one above. Work in pairs or individually.

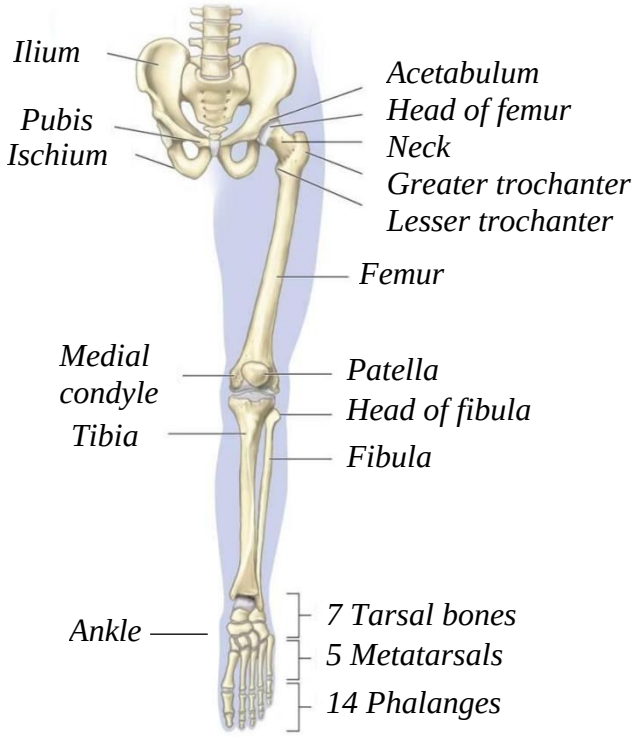


Fig. 15. Pelvic Girdle and Lower Extremity [11]

STUDENT INDEPENDENT WORK

Ex. 18. Write a passage of about 5–7 sentences describing one of the parts of either the axial skeleton or appendicular skeleton. Use the following plan: 1) describe the location; 2) specify the bone type and bony composition of the part; 3) state any differences between adults and children; 4) describe the function. Prepare to make a 3-minute report in class. Bring a visual aid. Use the QR-links for additional information (Fig. 16 and 17).

Fig. 16. Anatomy Book (online) QR

Fig. 17. Axial and Appendicular Skeleton (video) QR [12]

LESSON 3. PEDIATRIC SKELETON AND CONGENITAL SKELETAL ANOMALIES

Word Formation

Ex. 19 A. Review Table 2 below.

Table 2

Greek and Latin Parts of Anatomical Bone Terms

Word part	Definition	Examples with meaning
a-, an- ab-	a negative conveying deficiency, lack or weakness of	**A**trophy – decrease in size or wasting away of a body part or tissue; **Ab**normal – not normal
ana-	up, upward, again	**Ana**tomy – cutting up, dissection; **Ana**stomosis – the union of parts or branches
acro-	extremity, the highest/farthest end/edge	**Acro**mion – a bony process of the scapula; **Acro**megaly – abnormally large extremities
arthr(o)- art	referring to joint	**Arthro**sis **–** joint wear; **Art**iculate – to be **Arthr**algia – joint pain; connected by joints
digit- dactyl-	referring to fingers or toes	Inter**digit**al – between the fingers or toes; Poly**dactyl**y – one or more extra fingers or toes
chondr-	referring to cartilage	Hypo**chondr**iac – under the cartilage, imaginary disease; Osteo**chondr**osis – a disease of bone and cartilage growth centers in children
cephal- crani-	referring to head	Hydro**cephal**us – waterhead, a congenital deformation; **Cephal**ic – situated on, in, near the head; **Crani**al – situated on, in the skull (or **crani**um)
dys-	bad, difficult, defective	**Dys**function – bad functioning; **Dys**plasia [dɪs'pleɪzɪə] – bad formation
mel-	part of the body	A**melia** – absence of one or more limbs
oste(o)-	referring to bones	Peri**oste**um – around the bone, membrane covering the bone; **Osteo**genesis – bone growth, development; Syn**osto**sis – fusion of two or more bones
oss/i- oss/e-	referring to bones	**Ossi**cle – a small bone in the middle ear; **Ossi**fication – bone formation
ortho-	straight, correct	**Ortho**pedics – correction of deformities
plasia	development	**Hypo**plasia – underdevelopment

Ex. 19 B. Work in pairs. Discuss the terms of congenital anatomical abnormalities of the early age you can see below, try to explain the meaning of the term and give the Russian equivalent, and match the terms to the pictures (Fig. 18).

Craniosynostosis, syndactyly, dysmelia, limb aplasia, maxillary hypoplasia, macrocephaly, microcephaly.

A B C D E F G

Fig. 18. Pediatric Skeletal Dysplasia

Ex. 20. Add the Latin or Greek prefixes of anatomical position to the terms given and translate the new words. Pay attention to the English prefixes in brackets showing the meaning.

Sub- (from Latin *'under, lower than'*): osseous, costal, sternal, clavicular (clavian), mandibular, maxillary, mental, temporal, occipital, iliac, pubic.

Super- or Supra- (from Latin *'above, on top of'*): bony, costal, sternal, clavicular, maxillary, temporal, orbital, mental, spinal, iliac.

Hypo- (from Greek *'under'*): -chondriac, -glossal, physis, thalamus, -plasia.

Hyper- (from Greek *'above, over'*): -plasia, -trophy, -ostosis, -ostotic.

Infra- (from Latin *'under, below'*): orbital, costal, maxillary, sternal, temporal.

Intra- (from Latin *'inside'*): osseous, membranous, pelvic, thoracic, capsular.

Inter- (from Latin *'between, within'*): cranial, orbital, parietal, vertebral, costal, -osseal (-osseus), clavicular, spinal (spinous), pubic, articular.

Grammar Focus

Ex. 21 A. Review Table 3 below. What method is used to form the verb from the noun? Translate the phrases in the table.

Learn some words to enrich your Medical English vocabulary:

Cessation [seˈseɪʃən] – прекращение;

Ossification [ˌosɪfɪˈkeɪʃən] – окостенение.

Table 3

Examples of Noun–Verb Formation

Noun	Verb
a cause – *pl.* caus***es*** причина – причины the ***cause<u>s</u>*** of synostosis = synostosis ***cause<u>s</u>***	*to* cause – caus***ed*** *something* вызывать *что-л.*, быть причиной *чего-л.* he, she, it } caus***es*** Synostosis ***cause<u>s</u>*** pain
a result – *pl.* result***s*** результат – результаты the ***result<u>s</u>*** of ossification = ossification ***result<u>s</u>***	*to* result – result***ed*** *to* result ***in*** *smth* – привести к чему-л. (в результате) *to* result ***from*** *smth* – произойти из-за чего-л. (в результате чего-л.) It ***result<u>s</u> from*** fusion. Ossification ***result<u>s</u> in*** growth cessation

Ex. 21 B. Translate the sentences using the information from the exercises above.

1. Multiple suture craniosynostosis **causes** increased brain pressure.
2. Hip dysplasia **causes** in infants are often unknown.
3. Periosteal ossification **results in** thickening of a child's bones.
4. The bone scan **results** have shown that osteoblastic metastases may **cause** no pain.

Ex. 22 A. Read the information below.

Both ***to***-infinitive and ***bare*** infinitive (without ***'to'***) are usually translated into Russian with the verb answering the question «Что делать/сделать?». One of the most usual roles of the Infinitive in the English sentence is to denote the aim of another action. Originally, in this case it should follow the words ***'in order'***, which are equivalent to the Russian «чтобы». In practice, the words 'in order' are usually omitted, and you can see only the Infinitive. For example,

In childhood we need a lot of calcium ***(in order) to grow*** *healthy.*

В детстве мы нуждаемся в большом количестве кальция, ***чтобы расти*** *здоровыми.*

For-to-infinitive construction:

A child needs a lot of calcium ***for*** *his bones* ***to develop normally.***

Ребенку необходимо много кальция ***для нормального развития*** *костей (чтобы кости развивались нормально).*

Besides, there are other ways of translation depending on the role of the Infinitive in the English sentence. For example,

The humerus, radius and ulna articulate ***to form*** *the elbow joint.*

Плечевая, лучевая и локтевая кости сообщаются, ***образуя (и образуют)*** *локтевой сустав.*

The last bone ***to ossify*** *in the human body, typically around the age of 25, is the clavicle.*

Последней костью, ***которая окостеневает*** *в человеческом теле, как правило, в возрасте около 25 лет, является ключица.*

Ex. 22 B. Read and translate the sentences using the information above.

1. The unfused bones of the cranium allow the head to be flexible for it to pass through the birth canal during childbirth.
2. A pediatric orthopedic specialist should possess deep knowledge of pediatric bone anatomy to recognize and care for different osseous abnormalities.
3. The phalanges of the second and third fingers are the first to show centers of ossification.
4. The condition wherein the ball-and-socket joint of the hip forms abnormally in babies and young children to develop into dysplasia is called developmental hip dysplasia (DHD).

Text Translation

Ex. 23 A. Read the text. Think over the translation of the ***words in bold italics***. **Do not use a dictionary, or a translation application!!!** Work in small groups of 3–4 students. Take turns to translate the text.

Text E

Ossification

The process of ossification wherein bones gradually become harder and grow larger starts during fetal, or intrauterine, development, goes on throughout childhood, and adolescence to reach skeletal maturity by about age 20. Two distinct methods of ossification occur: intramembranous ossification and endochondral ossification.

Intramembranous, or periosteal, ossification is responsible for the formation of flat bones like ***those of*** the skull and the clavicle. ***Your*** clavicle begins ossification during the fifth week of development, but ***it*** is not only the first bone in the body to start ossifying but also the last ***one*** to complete ossification.

Endochondral ossification involves the replacement of hyaline cartilage with bone, which results in the elongation of the long bones in the appendicular skeleton. The presence of the epiphyseal plate, or growth plate, is essential for this process, which is the main cause for ***it*** to stay until the bone stops growing.

The ongoing growth of the epiphyseal plate is critical for long bones to continue increasing in length throughout childhood. Once a person reaches full skeletal maturity, the epiphyseal plates close, and the ossification centers fuse to mark the completion of bone development and growth.

Ex. 23 B. Make a list of ***Translation Tips*** answering the questions:

1. Is it necessary to translate the pronoun ‘your’ before body parts?
2. How can we translate the pronouns ‘those of’ and ‘one’?
3. What does the translation of the pronoun ‘it’ depend on?
4. What different methods of translation of the infinitive have you used while translating the text?

STUDENT INDEPENDENT WORK

Ex. 24 A. Get ready to speak about the structure and functions of the human skeletal system. Make 12–15 sentences. Follow the plan:

1. The definition of the skeleton (1 sentence).
2. The two main subdivisions of the human skeletal system (1 sentence).
3. The parts of the axial skeleton, their bony composition and main functions (5–6 sentences).
4. The parts of the appendicular skeleton, their bony composition and main functions (5–6 sentences).
5. Role of the skeleton for human health (1–2 sentences).

Ex. 24 B. Read and try to translate the description of two conditions in children: craniosynostosis (Fig. 19) and hip dysplasia (Fig. 20). Follow the rules:

1. Read the text through for overall understanding.
2. Look up ONLY individual words in the dictionary, if you can't guess their meaning from the context.
3. Make a list of signs and symptoms, diagnostic methods, and treatment/management together with the term translation.
4. Translate some sentences from the text orally ***speaking aloud*** to yourself or your friend.

Fig. 19. Bones Lesson 3 Exercise 24 QR: Craniosynostosis [14]

Fig. 20. Bones Lesson 3 Exercise 24 QR: Developmental dysplasia of the hip [15]

Ex. 25. Use the QR-link (Fig. 21) at the next page to familiarize yourself with the medical terms of the human muscular system. Practise the pronunciation using the tools. Provide Russian equivalents for muscle terms.

UNIT 2. HUMAN MUSCULAR SYSTEM

INTRODUCTION

The human muscular system, or human musculature, is composed of a tremendous variety of muscles that allow us to breathe and hold the breath, to eat and talk, to sit and walk, and to bend and straighten our arms and legs and, generally, to do lots of other voluntary things. What is more, think of involuntary acts: your heart beats tirelessly to let you stay alive, and your stomach processes the food you've eaten to provide you with vital energy.

Introductory Task

In order to realize the complex organization of human musculature, study the interactive 3-D model available through the QR-link below (Fig. 21). Practise saying the English terms naming the muscles. Provide the Russian equivalents for them.

Fig. 21. Muscular System 3-D Model QR [16]

Essential vocabulary

Nouns: muscle, a biceps – biceps, a triceps – triceps, a quadriceps – quadriceps, extensors, flexors, staepedius, trapezius, deltoids, rhomboids, rectus abdominus (abs), pectorals (pecs), latissimus dorsi (lats), soleus, gastrocnemius, sartorius, erectors, gluteus maximus (gluteals, glutes), agonist, antagonist, myosin, actin, filaments, tendon, bundles of fibers, fascicles, the perimysium, the epimysium, the endomysium, sarcomeres, myofibrils, tissue, striations, flexion, contraction, excitation, relaxation.

Verbs/Verb Phrases: to vary in shape/size, to classify according to the direction/function, to extend, to flex, to contract, to relax, to maintain, to move.

Adjectives (Participles): muscular, neuromuscular, smooth, skeletal, cardiac, voluntary, involuntary, striated, transverse, oblique, circular, convergent, parallel, pennate, fusiform, thick, thin, adjacent, conscious, unconscious.

Adverbs: consciously, unconsciouly, automatically, exclusively.

Essential Grammar

Passive Voice (revision), No Article vs. Definite Article, Complex Object, Complex Subject.

LESSON 1. TYPES OF MUSCLES

Sound Focus

Ex. 1 A. Study the pronunciation:

g/q+*ue* [g]/[k]**:** tong*ue*, oblique, unique, fatigue, picturesque, dialogue, plague, plaque, technique, colleague*;*

eu [ju:]: **Eu**rope, **eu**ro, n**eu**ron, n**eu**romuscular, n**eu**rologist, pharmac**eu**tical;

au [ɔ:]: **au**ra, **au**ricle, c**au**dal, g**au**ze, **au**tomatically, **au**tonomous;

qua [kwɔ:]: **qua**lity, **qua**ntity, **qua**rter, **qua**driceps, **qua**drangular;

myo [maɪə]: **myo**sin, **myo**filament, **myo**fibril, **myo**cardium.

Silent '*c*': mus*c*le, abs*c*ess, as*c*end, des*c*end, fas*c*inate, cons*c*ious [ˈkonʃəs], fas*c*icle.

Ex. 1 B. Practise the stress in the words and word combinations:

Trans**verse** ab**do**minal muscles; ob**liq**ue muscles; **ske**letal muscles; **car**diac **mu**scle; stri**a**ted **mu**scles; uni**penn**ate, bi**penn**ate and multi**penn**ate **mu**scles; con**verg**ent muscles; **pa**rallel **fas**cicles; **fu**siform **fi**bers; to con**tract** in**vol**untarily; to fa**ci**litate **mov**ement; u**niq**ue **fea**tures; dis**tinct** **pro**perties.

Before you read

Ex. 2. Discuss the questions below in small groups of 3-4 students.

1. Do you know how many muscles there are in our body? Does the number of muscles differ in a child and in an adult? What is the difference between a child's and an adult's muscular system?

2. The muscles in our body vary in shape, size and, of course, in names. Can you name some of the most famous muscles in English? Look at the diagram below for help (Fig. 22).

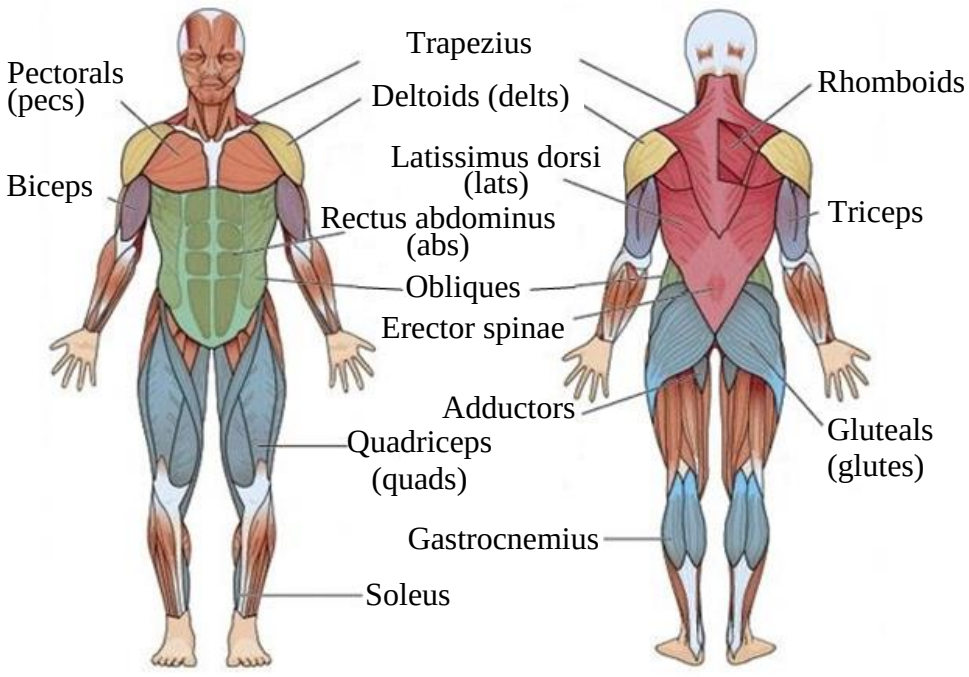


Fig. 22. Skeletal Muscles [18]

3. Read a short paragraph describing the human muscular system and guess what words are missing. Fill in the gaps choosing the words from the list (*the number of stars corresponds to the number of letters*). Do your answers to the questions in point 1 match the information in the text? What ***3 groups of muscles*** have you learned about?

Words: *made up, skeleton, cardiac, the number, stand up, skeletal, frown, in and out, being, involuntary, life, in children, strength, muscular.*

The human body contains more than 600 skeletal muscles that help us run and walk, sit down and (1) ***** **, breathe (2) ** *** ***, smile and (3) *****, and, generally, sustain (4) ****. Unlike the bony (5) ********, (6) *** ****** and types of muscles are the same both (7) ** ******** and adults, the difference (8) ***** only in mass and (9) ********. Our (10) ******** system is (11) **** ** of three main types of muscles: smooth (or (12) **********), (13) ******** (or voluntary) and (14) *******.

Enrich your Medical English vocabulary

Ex. 3. Read and translate the words, word combinations and phrases. Guess the meaning of some words by more familiar synonyms in brackets.

muscle [mʌsl]: an *intricate (= complex)* network of muscles, muscles vary in shape and size, ***smooth*** muscles, ***skeletal*** muscles, ***cardiac*** muscles, muscle *diversity (= variety)*

voluntary [ˈvoləntri], **involuntary:** ***flexors*** and ***extensors*** are voluntary muscles, involuntary muscles of *internal (= inner)* organs, voluntary movements

fiber [ˈfaɪbə]: bundles of fibers, or fascicles [ˈfæsɪklz], ***transverse*** muscles have horizontal fibers, ***oblique*** fibers, converging fibers of ***convergent*** muscles, diagonal fibers of ***pennate*** muscles, angled fibers, the pattern of fibers

striation [straɪˈeɪʃn]: ***skeletal*** muscles *possess (= have)* striations, ***smooth*** muscles are not ***striated*** [straɪˈeɪtɪd]

contraction [kənˈtrækʃn]: contraction and relaxation of muscles, myosin [ˈmaɪəsɪn] and actin [ˈæktɪn] ensure muscle contraction, ***to contract*** rhythmically

insertion [ɪnˈsɜːʃn]: the point of origin and insertion, insertion via the Achilles' tendon

fusiform [ˈfjuːzɪfɔːm]: biceps are fusiform muscles, fusiform muscles have ***parallel*** fascicles

Time to read

Ex. 4. Read the text silently. Then choose the title that best fits it. Discuss with your partner.

Which title fits best?

1. The Intricate Network of the Human Muscular System.
2. Types of Muscles.
3. Muscular System Terminology.

Text A

The human muscular system is an intricate network that enables movement and maintains posture. This comprehensive system includes numerous muscles that vary in shape and size. Primarily, it consists of three major groups of muscles: ***smooth muscles, skeletal muscles, and cardiac muscles*** (Fig. 23). Each group has distinct features and functions essential for the body's overall operation.

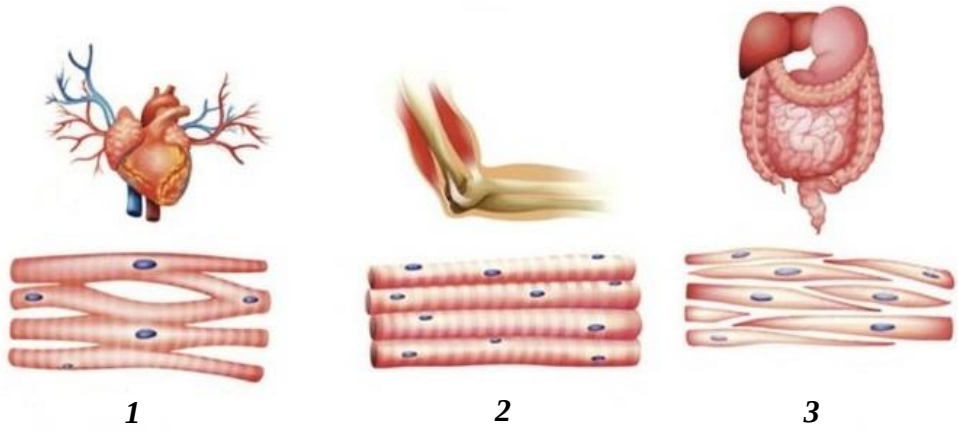


Fig. 23. Major Types of Muscles [20]:
1 – cardiac muscle, striated; *2* – skeletal muscle, striated; *3* – smooth muscle, non-striated

Smooth muscles (3) are involuntary muscles found in the walls of internal organs such as the stomach, intestines, and blood vessels. Unlike other muscles, they lack the striations found in other muscle types, giving them a smooth appearance. These muscles operate automatically, without conscious control, ensuring that internal processes like food digestion and blood circulation function efficiently.

In contrast, ***skeletal muscles (2)*** are striated muscles attached to bones by tendons, enabling voluntary movements. These muscles are under conscious control, allowing individuals to perform actions such as walking, lifting, and running. Examples include the biceps and triceps in the arms, which work together as an agonist and antagonist to flex and extend the forearm. The biceps contract to lift the forearms, while the triceps contract to lower them, which demonstrates how muscles can act as either a flexor or an extensor.

Cardiac muscles (1), found exclusively in the heart, share properties of both smooth and skeletal muscles. These striated muscles have the unique ability to contract rhythmically and continuously without tiring, which is essential for pumping blood throughout the body. Despite being under involuntary control, cardiac muscles possess a structure similar to skeletal muscles, with bundles of fibers forming the striations and containing myosin and actin, essential proteins for muscle contraction.

Muscles can also be classified according to the direction in which their fibers run. Two notable types are ***transverse*** muscles and ***oblique*** muscles. Transverse muscles have fibers that run horizontally, creating a stabilizing girdle for the body by compressing and supporting the abdominal organs. On the other hand, oblique

muscles have angled fibers that enable rotation and lateral bending of the torso, contributing to the flexibility and movability of the human body.

Anatomists identify four distinct shapes of skeletal muscles according to the pattern of the muscle bundles, or fascicles (Fig. 24). These are ***circular muscles*** with the fibers running round; ***convergent muscles***, where the origin (the attachment to the bone) is wider than the point of insertion; ***parallel muscles*** with the fascicles going parallel to each other; and ***pennate muscles*** having a diagonal pattern of bundles similar to a bird's feather. Sometimes, a fifth shape is isolated, which is called ***fusiform*** meaning spindle-like.

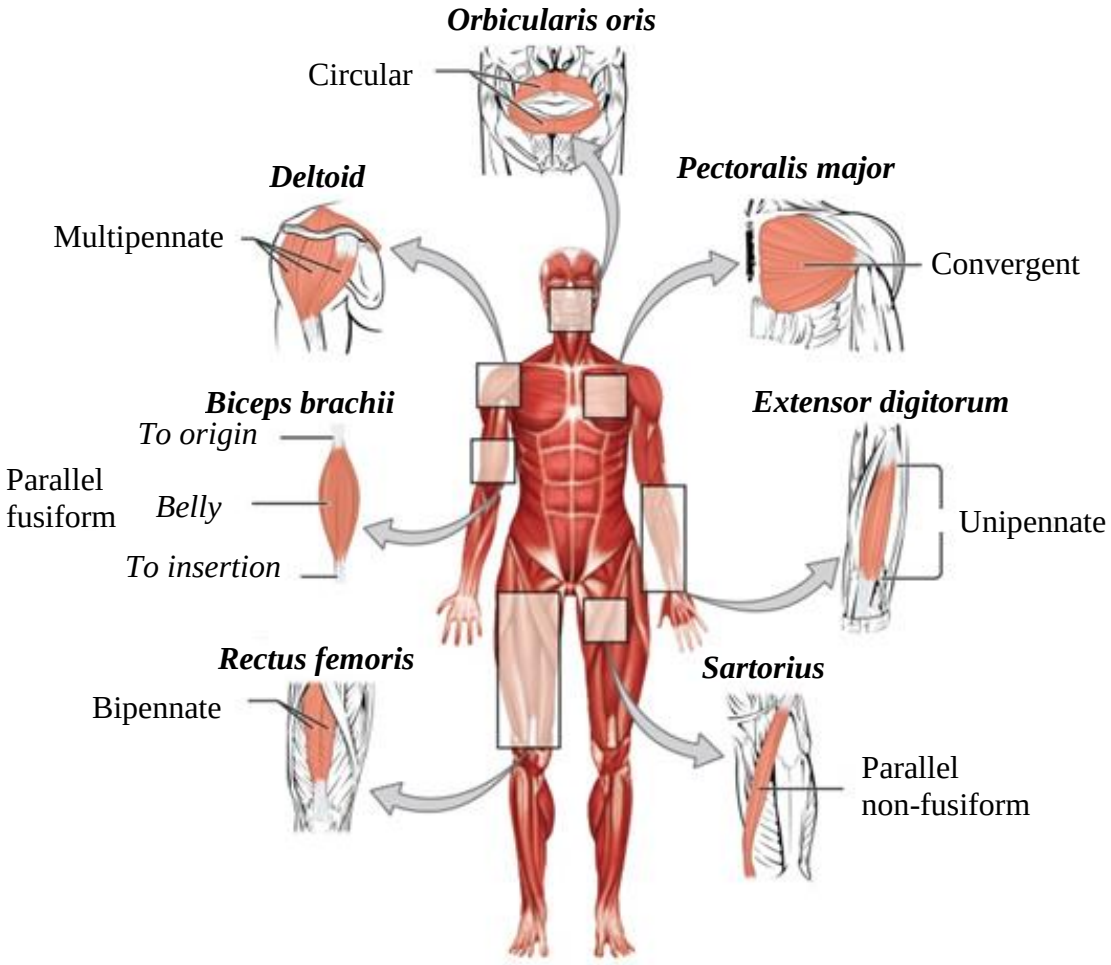


Fig. 24. Muscle Shapes and Patterns [21]

As for the sizes of muscles, the staepidius (стремечковая мышца) in the middle ear represents the smallest muscle, controlling the vibration of the stapes bone to protect the inner ear from loud sounds. Conversely, the gluteus maximus, situated in the buttocks, is the largest muscle, responsible for the movement of the hip and thigh. This muscle is crucial for actions such as climbing stairs, standing from a seated position, and maintaining an upright posture.

Throughout the body, muscles work together in harmony, each playing a specific role tailored to its location and function. Whether they are contracting to facilitate movement or providing stability and posture, the human muscular system

illustrates the complexity and efficiency of the human body. Understanding the diversity and functionality of muscles offers insight into how these vital components maintain our physical capabilities and overall health.

Check your understanding

Ex. 5. Read the text once again. This time read it carefully paying attention to details. Choose the most suitable answer to the question.

1. How do numerous muscles differ?

A. They differ in form and size.
B. They differ only in functions.
C. Some of them have specific characteristics.
D. They differ in form and size having specific features and functions.

2. What distinguishes smooth muscles from other muscle types?

A. Their ability to contract voluntarily.
B. Their lack of striations.
C. Their attachment to bones.
D. Their exclusive location in the heart.

3. What is specifically characteristic of skeletal muscles?

A. They are voluntary muscles moved consciously.
B. They form the walls of the inner organs.
C. They are attached to bones by ligaments.
D. They help to digest food.

4. How do biceps and triceps muscles demonstrate muscle functionality?

A. By always working simultaneously.
B. By controlling internal organ processes.
C. By acting as flexors and extensors.
D. By pumping blood through the body.

5. What unique characteristic do cardiac muscles possess?

A. Voluntary control.
B. Ability to tire quickly.
C. Rhythmic and continuous contraction.
D. Horizontal fiber orientation.

6. Which muscle type enables rotation and lateral bending of the torso?

A. Transverse muscles.
B. Oblique muscles.
C. Circular muscles.
D. Pennate muscles.

7. What conclusion can be drawn about muscle shapes from the text?

A. All muscles have identical structures.
B. Muscle shapes are purely decorative.
C. Different muscle shapes serve specific functions.
D. Muscle shapes are randomly determined.

8. How do muscles contribute to overall human body functionality?

A. By working in complete isolation.
B. By performing unrelated tasks.
C. By functioning harmoniously in specific roles.
D. By competing for bodily resources.

9. What does the text suggest about muscle diversity?

A. Muscles are simple and uniform.
B. Muscle types have limited variations.
C. Muscles demonstrate complexity and efficiency.
D. Muscle functions are insignificant.

Ex. 6. Match the halves of the sentences using the information from the text.

Part One

1. The human muscular system…
2. There are three primary muscle categories: …
3. Skeletal muscles, which are affixed to bones, …
4. Smooth muscles operate involuntarily…
5. Although cardiac muscles function autonomously, …
6. Muscles can also be classified…
7. Transverse muscles have horizontal fibers that support the abdomen, while…
8. The largest muscle is the gluteus maximus in the buttocks, …
9. The smallest muscle is the staepedius in the ear, …
10. The biceps and triceps in our arms …
11. All the muscles collectively …

Part Two

a. which provides protection from loud noises.
b. which aids in the movement of our hips and thighs.
c. they resemble skeletal muscles in appearance.
d. by the orientation of their fibers and fascicle pattern.
e. facilitates movement and maintains our posture.
f. to aid processes like food digestion and blood circulation.
g. provide the bending and straightening of our elbows.
h. smooth muscles, skeletal muscles, and cardiac muscles, each with its distinct function.
i. oblique muscles possess angled fibers that assist in twisting and lateral bending.
j. ensure our mobility and stability and support our overall health.
k. enable voluntary movements, such as walking or lifting objects.

Develop your Medical English Vocabulary

Ex. 7. Fill in the gaps changing the word in brackets so that it should fit into the sentence.

Model: Our (**MUSCLE**) *muscular* system consists of about 600 muscles.

1. Unlike smooth muscles, (**SKELETON**) muscles contract (**VOLUNTARY**).

2. Smooth muscles operate automatically or (**UNCONSCIOUS**).

3. Skeletal muscles are also called (**STRIATIONS**) muscles because they have long thin lines on their surface.

4. Rhythmical (**CONTRACT**) of cardiac muscles provide for pumping blood throughout the body.

5. The hamstring muscles that perform knee (**FLEX**) can also act as hip (**EXTEND**).

6. Strong (**ABDOMEN**) muscles commonly referred to as "six-pack" are a dream of many young men.

7. The (**MOVE**) of human fingers provided by the metacarpal, thenar and hypothenar muscles are unique.

8. The (**DIVERSE**) and (**FUNCTIONAL**) of the human muscles comply with the (**COMPLEX**) of human movements.

To do the exercise quicker, use the QR-link below (Fig. 25).

Fig. 25. Muscles Exercise 7 QR

Ex. 8 A. Match the definition on the left with the word on the right.

To do ***Exercises 8 A and B*** quicker, use the QR-link below (Fig. 26).

Fig. 26. Muscles Exercise 8 AB QR

Definitions	Words
1. Being wide on one side and moving towards one point on the other side	a. Fascicle
2. Resembling a bird's feather	b. Fusiform
3. A bundle or cluster of fibers running parallel to each other	c. Convergent
4. Happening without your deciding or choosing it	d. Flexibility
5. Being wide in the middle and narrowing to both ends like a spindle	e. Pennate
6. The ability to bend easily without breaking	f. Striations
7. Generally flat or unruffled, as a calm sea	g. Digestion
8. To make something easier or possible	h. To contract
9. The process of breaking down food in your stomach and intestines so that it can be absorbed by your body	i. Involuntary
10. To become smaller or shorter	j. To facilitate
11. Long, thin lines or marks on a surface	k. Smooth

Ex. 8. B. Find the best translation matches for the words. **Do not use a dictionary or translator!** Discuss with your partner. Complete and translate the word family lines below:

Verb		Adjective		Noun
to contract	–	… / contractile	–	…
…	–	…	–	digestion
…	–	convergent	–	convergence
…	–	striatal / …	–	striation
to facilitate	–	…	–	…
…	–	smooth	–	smoothie

STUDENT INDEPENDENT WORK

Ex. 9. Use the QR-link below to slide the pictures of different muscles (Fig. 27). Choose two different muscles to describe their location in the body, attachment to the bones (origin and insertion), type and form, and the movements it is responsible for.

Fig. 27. Muscles Slide Show Exercise 9 QR

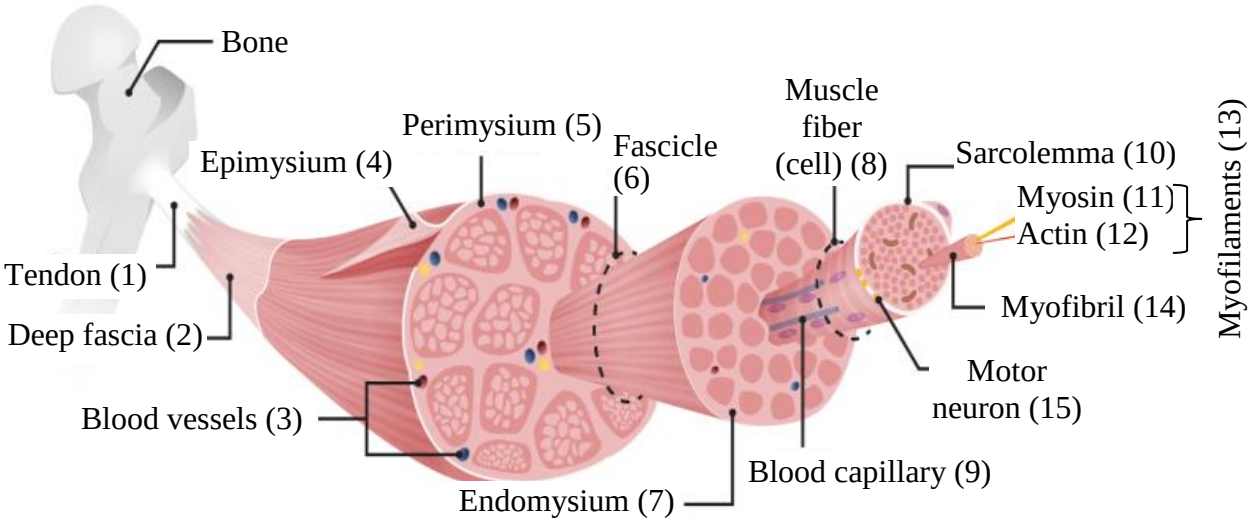
Use the QR-link and watch the video to learn more about human muscles (Fig. 28). Use the information to report about the muscle you've chosen to describe.

Fig. 28. The Muscular System (video) [22]

LESSON 2. STRUCTURE OF MUSCLES

Sound Focus

Ex. 10. Match the words denoting the structural elements of the human skeletal muscles to their transcription (Fig. 29). Read the words to practise their pronunciation and translate them.



a) [ˈmaɪəsɪn]
b) [blʌd ˈveslz]
c) [ˌendəʊˈmiːsɪ əm]
d) [ˈfæsɪkl]
e) [ˌperɪˈmiːsɪ əm]
f) [ˈtendən]
g) [diːp ˈfeɪʃɪə]
h) [ˌepɪˈmiːsɪ əm]
i) [ˈmʌsl ˈfaɪbə (sel)]
j) [ˈməʊtə ˈnjʊərɒn]
k) [ˈæktɪn]
l) [ˌsɑːkəʊˈlemə]
m) [blʌd kəˈpɪlərɪ]
n) [ˌmaɪəˈfɪləm(ə)nt]
o) [ˌmaɪəˈfaɪbrɪl]

Fig. 29. Skeletal Muscle Structure [19]

Grammar Focus

Ex. 11 A. Review Table 4 and compare the use of the definite article and the absence of the article.

Table 4

Articles with anatomical terms. The definite article 'the' vs. Zero article '×'

The	×
Unique organs (single or paired), parts and tissues of the body: ***the*** *heart,* ***the*** *lungs,* ***the*** *epimysium*	Body substances: ***iron, calcium, serotonin***
Body systems: ***the*** *nervous system,* ***the*** *respiratory system*	Countable nouns when thought as substances: covered with ***connective tissue*** Often unique body parts after the word 'called', 'named': surrounded by connective tissue *called* ***(the) epimysium***
Body processes in ***of***-phrases: **the** contraction ***of*** cardiac muscle tissue	Body processes: ***nutrition***, ***contraction***, ***circulation***, ***digestion***
Numerous body parts in ***of***-phrases, ***in***-phrases and similar defining phrases: ***the*** *muscle fibers* ***in*** *the arm,* ***the*** *myocytes* ***of*** *the heart*	Numerous body parts at first mention: ***myocytes***, ***blood vessels***, ***nerves***, ***muscle fibers***

Ex. 11 B. Work in pairs. Using the information from Table 1 (Unit 1, Lesson 2, p. 16), and the information from Table 4 above fill in the articles if necessary into the muscle profiles below. Use Figure 24 (p. 31) to guess the muscle. *Pay special attention to the preposition with the verb 'to insert'.* Translate the names of the muscles.

Text B

Profile A

Learn the words:

acetabulum – вертлужная впадина

patellar tendon – надколенное сухожилие

Located in _anterior compartment of _thigh, this muscle is _powerful hip flexor. Together with the other three muscles, it is _part of _quadriceps group. It originates from _two points above _acetabulum. _point of its insertion is _patella and _anterior surface of _tibia via _patellar tendon. It is _bipennate muscle.

Profile B

Learn the words:

forced inspiration – форсированный вдох

It is _largest muscle of _anterior chest wall. It has _two heads: _clavicular and sternocostal head that originate from _clavicle and _sternum and costal cartilages accordingly. Its form is _fan-like and _its fascicles converge and ***insert on*** _humerus. Its main action is _adduction and medial rotation of _arm. Moreover, it assists in _arm flexion and extension and takes part in _forced inspiration.

Profile C

Learn the words:

coracoid process – клювовидный отросток

supraglenoid tubercle – супрагленоидный бугорок

It is _fusiform muscle located in _arm. _muscle is composed of _short head and _long head. _short head originates from _apex of _coracoid process of _scapula. _long head originates from _supraglenoid tubercle of _scapula. Its main functions are _flexion and supination (outward rotation) of _ forearm.

Develop your vocabulary

Ex. 12. Review the information on the English prepositions below. Discuss in pairs or small groups: what matches the English prepositions in the Russian language. Take turns to read and translate the prepositional phrases.

Of: the structure … muscles; the symptoms … the disease; striations are characteristic … skeletal muscles; to consist/be composed/be made up … myofibrils;

In: … children; … men; … women; … adults the muscles are stronger; … turn; to vary … structure; varying … frequency; red … colour; to be located/situated … the hip; to result … muscle contraction;

To: to go … the chemist's (… the doctor's); to be admitted … hospital; to be attached … bones; temporalis is referred … as a fan-shaped muscle; to be similar … a fan; to be classified according … their structure; to be tailored … a specific function; to contribute … the development;

Into: to come … the room; all muscles are divided … three groups; a medicine injected … bloodstream; to gain insight … human musculature;

From: to come … Greek; to originate … iliac spine; to be discharged … hospital; to be separated … each other; to differ … smooth muscles; to protect … friction; to result … relaxation;

For: to be crucial/essential … people; biceps are responsible … arm flexion; looking/searching … a job/a decision; to be available … kids *under* 2; … him to understand; to provide … contraction/contracting;

By: to be provided … motor neurons; … nature/character/structure; the muscle tension was subsiding … and …; … seven o'clock;

With: to be ill … arthritis; to be covered … epimysium; to comply … the rules; to move … conscious control; to deal … a problem; … evidence;

Without: a smooth recovery means … complications; to move … conscious control; to deal … help; … evidence.

Ex. 13 A. Use the QR-link (Fig. 30) to watch the video about the structural composition of the skeletal muscle tissue, Episode 1. Then read the summarizing passage below and choose the right preposition.

Fig. 30. Skeletal Muscle Tissue Video Episode 1 QR [26]

Text C (Part 1)

The Structure of Skeletal Muscles

Skeletal muscles are attached *to / on* bones *by / with* tendons and separated *of / from* each other *with / by* deep fascia. The whole muscle is covered *over / with* connective tissue called the epimysium and is made up *of / from* fascicles, or bundles *of / in* muscle fibers, which in turn are also wrapped *onto / in* connective tissue referred *to / by* as the perimysium. A muscle fiber, which is a muscle cell, or a myocyte, is protected *from / by* the endomysium, a layer of connective tissue surrounding individual myocytes and containing blood vessels and nerves essential *for / to* muscle nutrition and contraction. Each muscle cell has the cell membrane called *by / the* sarcolemma.

To do it quicker and more interactively, use the QR-link (Fig. 31).

Fig. 31. Muscles Lesson 2 Exercise 13 A QR

Ex. 13 B. Use the QR-link to watch Episode 2 of the video about the structural composition of the skeletal muscle tissue (Fig. 32). Then choose the prepositional phrases from the list to fill in the gaps in the summary.

Fig. 32. Skeletal Muscle Tissue Video Episode 2 QR [26]

To do it quicker and more interactively, use the QR-link (Fig. 33).

Fig. 33. Muscles Lesson 2 Exercise 13 B QR

List of phrases: *of thick and thin myofilaments; in contraction initiation; of skeletal muscles; towards the middle; of myosin; without excitation; couple with; with myofibrils; of sacromeres; on a voluntary basis.*

Text C (Part 2)

Each muscle fiber is filled (1), which consist (2) – the basic contractile units of the muscle crucial for contraction and reflecting the striations characteristic (3). The sarcomeres are made up (4), which enable muscle movements. The thick myofilaments are made (5), while the thin myofilaments contain actin molecules. The actin molecules have myosin-binding sites that (6) the protruding heads of myosin filaments. Motor neurons connect to muscle fibers and send signals resulting (7). Myosin and actin create cross bridges. Myosin heads rotate and pull actin filaments inward, sliding (8) and shortening the sarcomere. Skeletal muscles contract (9), which means under conscious control of the nervous system. (10) of the neurons, muscles remain relaxed.

Ex. 14 A. Review the information below to revise the word order in English questions (Fig. 34).

Question word (Wh-word)*	Predicate changeable / Auxiliary (e.g., ***is/was/did/can/will***, etc.)	Subject	Predicate Sense base	Other members*	?

* – optional members.

Fig. 34. Word Order in English Questions

Ex. 14 B. Unscramble the words to make questions. Work in pairs or small groups. Take turns to answer the questions.

Questions:

1. skeletal / What / to / are / attached / muscles ?
2. with / whole / covered / the / is / What / muscle ?
3. surrounding / is / cells / the / of / muscle / called / individual / What / layer / connective / tissue ?
4. basic / the / muscle / What / are / the / of / units / contractile ?
5. thick / What / are / of / the / myofilaments / made ?
6. thin / do / filaments / contain / What ?
7. How / contraction / start / does ?
8. without / possible / contraction / excitation / Is / neuron ?

Ex. 15 A. Use the QR-link to watch the video on Cardiac Muscle Tissue Anatomy & Physiology (Fig. 35). Before you watch learn the following words to enrich your Medical English vocabulary:

intercalated disc – вставочный диск;
pacemaker – водитель ритма;
gap junction – щелевидное соединение.

Fig. 35. Cardiac Muscle Tissue Video QR [27]

Ex. 15 B. Read the conversation between an examiner and a student. Open the brackets to use the verb in the correct form in the examiner's questions.

Examiner: How (to describe) cardiac muscle cells in terms of shape?
Student: Well, I suppose they are cylindrical. Or maybe fusiform.
Examiner: How many nuclei (to find) in cardiac muscle cells?
Student: I know it, I'm sure. One or two nuclei at the periphery of the cell.
Examiner: What (to compose) a myocyte of?
Student: It seems to me, a myocyte is made up of something called sacrums. And they contain proteins called acsin and myotin that create striations.
Examiner: Cardiac muscle tissue (to find) only in the heart or in other inner organs as well?
Student: Surely, only in the heart.
Examiner: How (to control) cardiac muscle?
Student: It isn't controlled it's absolutely uncontrollable.
Examiner: What (to call) the complex junctions that join cardiac muscle cells?
Student: Interlocation discs, because they are located between the cells.
Examiner: What (to call) the muscle layer of the heart?

Student: I think, it is cardiomysium. ‘Cardio’ stands for ‘heart’. And ‘mysium’ means ‘muscle’.

Examiner: Cardiac muscle cells (to separate) by endomysium or pericardium?

Student: Pericardium, if I’m not mistaken.

Examiner: What role (to play) gap junctions?

Student: What gaps? There are no gap junctions in cardiac muscle tissue.

What grade, do you think, this student got? Provide correct answers to the examiner’s questions. Role-play the conversation.

STUDENT INDEPENDENT WORK

Ex. 16. Watch the three videos on the structure of the three types of muscle tissue (Fig. 35, 36, 37). Summarize the information from the video in a comparison table according to the following parameters: 1) location of the muscle type; 2) shape of the muscle type (*e.g. cylindrical, branched*); 3) specific names of muscle layers (*e.g. epimysium, myocardium*); 4) control of contraction (*e.g. voluntary*); 5) mechanism of contraction (*e.g. sliding filaments*).

Fig. 36. Skeletal Muscle Tissue Full Video QR [26]

Fig. 37. Smooth Muscle Tissue Video QR [28]

Get ready to report in class. Practise using the linking words of comparison.

Similarity: as, the same as, like, too, both…and, similar(ly) to, in the same way, have in common, etc.;

Contrast: but, yet, unlike, while, whereas, however, as opposed to, contrary to, on the other hand, on the contrary, although, etc.

LESSON 3. CHILDHOOD MUSCLE DISEASES

Word Formation

Ex. 17 A. Review Table 5 below.

Table 5

Medical English-Russian Matches of Latin (Greek) Letter Combinations

Spelling	Sound	Russian	Examples
itis	[aitis]	ит	bursitis – бурсит
osis	[əʊsis]	оз (ёз)	spondilosis – спондилёз
myo	[maɪə(ʊ)]	мио	myositis – миозит
cyte (cyto)	[sait]	цит (цито)	myocyte – миоцит cytoplasm – цитоплазма
c + a, u, o	[k]	к	**c**alcium – **к**альций
c + i, y, e	[s]	ц	cal**c**ium – каль**ц**ий
ch	[k]	х	chondrosis – хондроз
ic	[ik]	*чаще всего*: ческий (чный)	allergic – аллергический *pathogen*ic* – патогенный
ous	[əs]	*чаще всего*: озный	ganrenous – гангренозный *infectious – инфекционный
eu	[ju:], *or* [u]	ей (ев)	neuron – нейрон pleura – плевра
ium	[ɪəm]	ий	endomysium – эндомизий
y	[ɪ]	ия	agony – агония
ph	[f]	ф	phlegm – флегма
th	[θ]	т	pathology – патология
rh	[r]	р	rhythm – ритм

Ex. 17. B. Practise the pronunciation and translate the names of diseases using the rules from Table 5 above.

Metabolic myopathy, toxic myopathy, polyneuropathy, mitochondrial myopathy, sporadic myositis, infectious myopathy, polymyositis, orbital myositis, juvenile myositis, physiologic atrophy, spinal muscular atrophy, cardiomyopathy, myasthenia gravis, visceral myopathy, multisystemic smooth muscle dysfunction syndrome, muscular dystrophy, lymphadenopathy, rheumatoid arthritis, arrhythmia.

Ex. 18 A. Read the information about the meaning of two suffixes associated with the names of diseases.

- osis: An abnormal condition or any physiological or pathological change.

E.g.: arthrosis – a degenerative disease of a joint resulting in changed physiology.

- itis: An inflammatory disease, inflammation of an organ.

E.g.: arthritis – inflammation of a joint.

Ex. 18 B. Play a Guessing Game. ***"Is it -osis or -itis?"***

a) It refers to age-related wear and tear of your ***spine****. This can happen when your disks and joints degenerate, causing reduced spinal movement, or stiffness.

b) It manifests as ***tendon*** pain due to inflammation. A person can help ease symptoms through anti-inflammatories and ice.

c) It is an inflammatory condition that affects the joints in your ***spine.*** It causes pain, stiffness and fatigue. It can result in swelling, a change in skin color, and warm joints.

d) It is a chronic ***tendon*** trauma that typically occurs due to overuse of the tendon. It can cause symptoms such as swelling, burning pain, and stiffness. It is a degenerative condition that can worsen without proper treatment.

***Note:** spine is 'spondylo' in Ancient Greek.*

Grammar Focus

Ex. 19 A. Work in small groups. Read the information, help each other to find answers to the questions and fulfill the tasks.

Complex Subject

1. To express a general opinion we can use the following verbs: *to say, to report, to expect, to know, to think, to consider, to show, to see, to find, to hear, to observe, to reveal, to estimate, to believe, to suppose, to assume, etc.* We can do it in several ways. Compare the sentences and answer the questions that follow:

1) They consider that dactylitis develops due to psoriatric arthritis.

2) It is considered that dactylitis develops due to psoriatric arthritis.

3) Dactylitis is considered to develop due to psoriatric arthritis.

Do these sentences express one and the same idea?

How many Subjects does each sentence contain?

How many PredicateVerbs does each sentence contain?

What are the Predicate Verbs in sentence 3 expressed by?

Which sentence sounds least official?

Which sentence sounds most official, most tailored to a research paper?

Translate the sentences. Are the translations different?

*Do you agree that the Subject in Sentence 3 is a **Complex Subject**?*

2. Compare the sentences with Complex Subjects and answer the questions that follow:

1) Dactylitis is found to develop due to psoriatric arthritis.

2) Dactylitis turns out to develop due to psoriatric arthritis.

Are the PredicateVerbs similar in form? What is the difference?

Translate the sentences.

Learn other verbs that take the same form as in the second sentence: *to appear, to prove – оказываться; to seem – казаться, оказываться.* Change the first verb in sentence 2 to create new sentences with the same meaning.

3. Compare new sentences with Complex Subjects and answer the questions that follow:

1) Dactylitis is believed to develop due to psoriatric arthritis.

2) Dactylitis proves to develop due to psoriatric arthritis.

3) Dactylitis is likely to develop due to psoriatric arthritis.

4) Dactylitis is unlikely to develop due to psoriatric arthritis.

What are the Predicate Verbs in these sentences expressed by?

What is the difference between sentence 3 and sentence 4?

Translate the sentences using the same pattern of translation as you have used above. What tense is it better to use for the translation of 'to develop' into Russian, future or present?

Learn other phrases that have the same form as in sentence 3-4: *to be likely – вероятно; to be unlikely – маловероятно, вряд ли; to be certain – несомненно; to be sure – наверняка.*

4. Translate pairs of sentences and state the difference.

Psoriatric arthritis ***proves*** to be the cause of dactylitis in many cases.

Psoriatric arthritis ***proved*** to be the cause of dactylitis in many cases.

Psoriatric arthritis is assumed ***to be the cause*** of dactylitis in many cases.

Psoriatric arthritis is assumed ***to have been the cause*** of dactylitis in that case.

Psoriatric arthritis ***is thought*** to be the cause of dactylitis in this case.

Psoriatric arthritis and rheumatoid arthritis ***are thought*** to be the cause of dactylitis in many cases.

Ex. 19 B. Work in pairs. Read the passage and open the brackets to form Complex Subjects. Translate the sentences. Follow the pattern of translation discussed above. Guess the word ***'comorbidities'*** from the context. Do you think it is normal to use a Complex Subject in each sentence?

Text D

The childhood-onset or juvenile idiopathic inflammatory myopathies (JIIMs) *(to prove)* to be a heterogenous group of rare and serious autoimmune diseases of children and young people. The disease *(to observe)* to develop in children under 15, though its peaks, or exacerbations, *(to find)* to manifest in adults between ages 45–54. There are three major types: polymyositis, sporadic inclusion body myositis and dermatomyositis, however, the last one *(to be likely)* to occur most commonly. JIIM *(to reveal)* to cause muscle weakness as a major symptom. The condition *(to report)* to affect proximal muscles first, which results in difficulty lifting the arms above shoulder level when combing or dressing; getting up from a low chair; boarding a transport; and climbing the stairs. When the neck flexors are affected, the patient *(to be unlikely)* to lift the head from the pillow, and he drops his head onto his chest. Although treatments and management *(to say)* to have much improved over the past decade, few validated prognostic biomarkers are available with which to predict response to treatment, ***comorbidities*** (such as calcinosis) or outcome.

Text Translation

Ex. 20 A. Read the text. Think over the translation of the ***words in bold italics***. **Do not use a dictionary, or a translation application!!!** Work in small groups of 3–4 students. Take turns to translate the text.

Text E

Muscular Dystrophy

Muscular dystrophy (***MD***) refers to a group of genetic diseases that cause progressive weakness and degeneration of skeletal muscles. These disorders ***tend to vary*** in age of onset, severity, and the pattern of the affected muscles. All forms of MD grow worse over time as muscles progressively degenerate and weaken. Many people with MD lose the ability to walk. Some types of MD are also found to affect the heart, lungs, gastrointestinal system, endocrine glands, spine, eyes, brain, or other organs. Some people with MD ***may develop*** a swallowing disorder.

The causes of muscular dystrophy seem to be different, although the mechanism of muscle tissue damage is ***primarily*** monotypic. The muscle fiber membrane contains a group of proteins, known as the dystrophin-glycoprotein complex, that prevent damage when muscle fibers contract and relax. When this protective membrane is damaged, muscle fibers begin to leak the protein creatine kinase and take on excess calcium. This damages the muscle fibers and ***eventually*** causes them to die, leading to progressive muscle degeneration. Some forms of MD are caused by defects in this dystrophin-glycoprotein complex. Others are caused by defects in the surrounding connective tissue. Still others are caused by expression of toxic gene products in muscle fibers.

Duchenne muscular dystrophy (***DMD***) is likely to be the most common childhood form of MD. Because inheritance is caused by a mutation on the X chromosome, DMD ***predominantly*** affects boys, although girls who carry the defective gene may show some symptoms. DMD results from an absence of the muscle protein dystrophin. It usually becomes ***apparent*** during the ***toddler years***, sometimes soon after an affected child begins to walk. Progressive weakness and muscle wasting (a decrease in muscle strength and size) caused by degenerating muscle fibers begins in the upper legs and pelvis before spreading into the upper arms. Other symptoms include: loss of some reflexes, a waddling gait, frequent falls and clumsiness (especially when running), difficulty when getting up from a sitting position or when climbing stairs, changes to overall posture, impaired breathing, heart problems (cardiomyopathy).

Ex. 20 B. Do the tasks and add information to your **Translation Tips**:

1. Which translation of the subject-predicate group is better?

Some people may develop

1) Некоторые люди развивают… 2) У некоторых людей развивается…

2. Find all cases of Complex Subject in the text. Check their translation.
3. Find all cases of the usage of the word ‘cause’. Analyze each case.
4. Find out on the Internet to what age the phrase ***‘toddler years’*** refers. Find out about other words denoting the age of children.
5. Note down the translation for the words ***‘eventually, primarily, predominantly’***.

STUDENT INDEPENDENT WORK

Ex. 21 A. Get ready to speak about the structure and functions of the human muscular system. Make 12–15 sentences. Follow the plan:

1. Three major groups of muscles (1 sentence).
2. Smooth muscles and their characteristics (2–3 sentences).
3. Skeletal muscles and their characteristics (2–3 sentences).
4. Cardiac muscles and their characteristics (2–3 sentences).
5. Other muscle classifications, e.g. according to their direction or shape (3–4 sentences).
6. Role of muscles in the human body (1–2 sentences).

Ex. 21 B. Start making disease profiles. Review the texts in exercises 19 B and 20 A again. Note down the information according to the following plan:

1) Disease name;
2) Signs and symptoms;
3) Cause (causative agent);
4) Treatment (management);
5) Complications.

Look for any missing information on the Internet.

Ex. 22. Use the QR-link (Fig. 38) at the next page to familiarize yourself with the medical terms of the human cardiovascular system. Practise the pronunciation using the tools. Study the words from ***Essential Vocabulary*** as well. Provide Russian equivalents for the terms.

UNIT 3. HUMAN CARDIOVASCULAR SYSTEM

INTRODUCTION

Do you feel your heart beating? Indeed, you live from the moment your heart starts beating when you are still in your mother's womb and while your heart is beating throughout your life. Have you ever thought what a marvel the human heart is! Every element in its structure is accurately and specifically designed to sustain a human life working in perfect harmony. Yet, the role of the heart is really simple: to pump blood.

Introductory Task

Study the interactive 3-D model available through the QR-link below (Fig. 38) to see how it works. Practise saying the English terms naming the elements of the human heart using the tools. Provide the Russian equivalents for them.

Fig. 38. The Human Heart 3-D Model QR [34]

Essential Vocabulary

Nouns: the heart, chamber, atrium – atria, ventricle, the septum, the pericardium, the epicardium, the myocardium, the endocardium, valve, the blood flow, vessel, the aorta, artery, vein, arteriole, venule, capillary, the carotid, the rhythm, foramen – foramina, the foramen ovale, the vena cava – venae cavae, loop, the apex, layer, the heartbeat, circulation.

Verbs: to pump, to carry, to function, to propel, to comprise, to line, to dilate, to contract, to maintain, to perform, to taper, to be positioned, to bypass, to rest, to beat, to commence.

Adjectives (Participles): cardiac, vascular, cardiovascular, pulmonary, systemic, oxygenated, deoxygenated, conical, costal, intercostal, atrial, ventricular, outermost, innermost, tricuspid, mitral, semilunar, aortic, arterial, double-walled, flawless, life-sustaining, superior, inferior, contractile, adjacent, portal, septal.

Adverbs: merely, simultaneously, precisely, considerably, significantly.

Essential Grammar

Articles vs. Prepositions; Degrees of Comparison; Participle I and II (Present and Past Participle): forms and role in the sentence; Present Continuous Active and Passive.

LESSON 1. THE STRUCTURE AND FUNCTIONS OF THE HUMAN HEART

Sound Focus

Ex. 1 A. Remember the pronunciation:

-o- [ʌ]: **o**ther, ab**o**ve, d**o**uble, acc**o**mpany, t**o**ngue, am**o**ng, n**o**ne, st**o**mach, th**o**rough, **o**utside, all**o**w, l**o**ve;

-oo- [u:]: g**oo**d, st**oo**d, l**oo**p, t**oo**, sm**oo**th; **!** bl**oo**d [blʌd], fl**oo**d [flʌd];

-ar- [ɑ:]: m**ar**vel, c**ar**diac**,** l**ar**ge, **ar**tery, **ar**ch, he**ar**t**,** gu**ar**d;

-i-, -y- [aɪ]: prec**i**se, b**i**ological, m**y**ocardial, m**i**tral, pr**i**mary, tr**i**cuspid, d**i**astolic;

-i-, -y- [ɪ]: th**i**ck, th**i**n, ox**y**gen, r**i**b, m**i**ddle, s**y**stolic, cap**i**llaries, rh**y**thm, carot**i**d.

Ex. 1 B. Practise the pronunciation and mind the stress in the following words:

chamber, **at**rium, **mul**tiple, **ven**tricle, cardio**vas**cular, tri**cus**pid valve, myo**car**dium, peri**car**dium, endo**car**dium, **pul**monary **ar**tery, **o**xygenated blood, de**o**xygenated blood, **mi**tral valve, pul**mo**nic valve, a**or**tic valve, semi**lu**nar, embry**o**nic, circu**la**tory, ca**pi**llary, fo**ra**men o**va**le

Before you read

Ex. 2. Work in small groups of 3–4 students.

1. Think independently for a moment about three functions of the heart you believe are essential for human life. Then discuss your ideas with your team and choose one you think is the most important. Share your idea with the whole class and provide arguments to support it.

2. Look at the diagram of the human heart below (Fig. 39). Study the diagram carefully for 60 seconds.

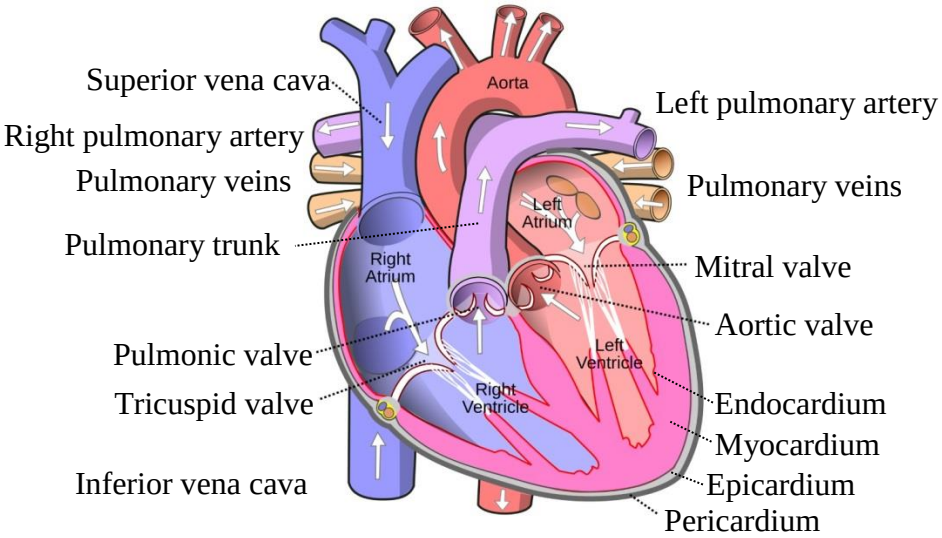


Fig. 39. Structure of Human Heart [35]

Cover the diagram with a piece of paper or your notebook. Let one member of your team open the QR link below (Fig. 40) and solve the quiz together.

Fig. 40. Heart Quiz QR [36]

Enrich your Medical English Vocabulary

Ex. 3. Read and translate the words, word combinations and phrases.

position [pəˈzɪʃn]: advantageous/favourable position; its current position is unfavourable; to position the palm on the chest; to be positioned well/badly; it is positioned against the wall;

rest: to put somebody on bed rest; Have you had a bad rest? the heart rests behind the breastbone; beats per minute at rest;

pump [pʌmp]: to act as a pump; a cardiac pump; a blood pump; to pump blood throughout the body; pumping ability; the blood is pumped into the aorta;

an atrium [ˈeɪtriəm] **– atria** [ˈeɪtriə]: the left atrium; the right atrium; the human heart has two atria; atria are upper chambers of the heart;

a ventricle [ˈventrɪkl] **- ventricles:** the right ventricle; the left ventricle; the left atrium is above the left ventricle; the thick walls of the right ventricle; the walls of the left ventricle are thicker;

a valve [vælv] **- valves:** the tricuspid valve; the mitral (bicuspid) valve; the semilunar valves; the aortic valve; the pulmonary/pulmonic valve; to be pumped through the valve;

the septum [ˈseptəm]: the interatrial septum; the interventricular septum; to be divided by the septum;

the aorta [eɪˈɔːtə]: the aorta is the body's largest artery; to be propelled into the aorta; the aorta arches; ascending aorta; descending aorta; **aortic** arch;

an artery [ˈɑːtri] **- arteries, a vein** [veɪn] **- veins, a capillary** [kəˈpɪləri] **- capillaries:** iliac arteries; arteries carry oxygenated blood; veins return deoxygenated blood; capillaries facilitate gas exchange; arteries, veins and capillaries are vessels; vena cava – venae cavae;

circulation [ˌsɜːkjəˈleɪʃn]: blood circulation; pulmonary circulation; general circulation; systemic circulation; **circulatory**; to complete the circulatory loop.

Time to read

Ex. 4. Look through the text for 30 seconds and choose the best title of the three titles below:

1. The functions of the human heart;
2. The location, structure and functions of the human heart;
3. The exact positioning and functionality of the human heart.

Text A

The human heart, a marvel of biological engineering, is positioned within the thoracic cavity behind the breastbone. It has a conical shape, with the base resting precisely against the third rib and the apex lying just to the left of the sternum at the interspace between the fifth and sixth costal cartilages. The heart, composed of four heart chambers, has a **complex** structure and performs **multiple** crucial functions. The upper chambers, known as the right and left atria, receive blood and are situated above the larger, muscular lower chambers called the right and left ventricles.

Located in the right portion of the heart, the tricuspid valve regulates the blood flow between the right atrium and the right ventricle. Once blood passes through this valve, it is pumped into the pulmonary arteries for pulmonary circulation, where it gets **oxygenated** in the lungs. After completing this oxygenation process, the blood returns to the left atrium and flows through the mitral valve into the left ventricle. From there, it is propelled into the aorta, the body's largest artery, to begin its journey through the systemic circulation. The aorta arches over the left lung, goes down the vertebral column until it reaches the level of the fourth lumbar vertebra, where it divides into the right and left iliac arteries.

The heart's right and left sides are divided by the septum, a **robust** muscular wall that prevents the mixing of oxygenated and deoxygenated blood. Each side of the heart dilates and contracts **simultaneously**, maintaining the **precise** rhythm essential for effective blood circulation. We perceive this rhythm as beats per minute (bpm), while feeling the pulse, which is normal in the range of 60–100 bpm.

Adjacent to the heart, the vena cava serves as the **major** vein returning deoxygenated blood from the body to the right atrium. There are two types of this vein: the superior vena cava, which brings blood from the upper body, and the inferior vena cava, which drains blood from the lower body.

Additionally, the heart structure integrates the semilunar valves, particularly the aortic and pulmonic valves, which prevent backflow of blood into the ventricles. These valves open and close in response to pressure changes within the heart chambers, directing blood flow with **flawless** precision.

The heart walls are organized into three layers. The outermost layer, the pericardium, is a double-walled sac that encloses the heart, offering protection and reducing friction as the heart beats. The middle layer, the myocardium, is a thick, muscular layer responsible for the heart’s contractile force. Logically, the walls of the left ventricle are much thicker than those of the right one promoting effective contraction. Finally, the innermost layer, the endocardium, lines the heart chambers and valves, providing a smooth surface for blood flow.

The heart is not merely an isolated organ. It is the center of an **intricate** network of vessels, which altogether form the cardiovascular, or circulatory system. There are three types of vessels – arteries, veins, and capillaries – that together facilitate the movement of blood throughout the body. Arteries carry oxygenated blood away from the heart, veins return deoxygenated blood to the heart, and capillaries facilitate the exchange of gases, nutrients, and wastes at the cellular level.

In summary, the heart structure combined with its strategic location ensures that the heart operates **tirelessly** due to the **incredible** coordination of its atria, ventricles, and valves performing its **life-sustaining** role with amazing accuracy and efficacy.

Check your understanding

Ex. 5. Read the text again more carefully, guess the meaning of the words in bold from the context, and pick the right answer to the questions below.

1. What is the precise positioning of the heart within the thoracic cavity?

A. The heart is positioned below the breastbone, with its base resting against the fifth rib.

B. The heart is located in the right portion of the thoracic cavity, close to the sternum.

C. The heart's apex lies to the left of the sternum at the interspace between the fifth and sixth costal cartilages while its base rests against the third rib.

D. The heart is situated in the centre of the thoracic cavity, with its shape being conical.

2. What is the primary function of the tricuspid valve within the heart?

A. To regulate the blood flow between the right atrium and the right ventricle.

B. To prevent the backflow of blood into the ventricles during contraction.

C. To facilitate the exchange of gases, nutrients, and wastes at the cellular level.

D. To allow deoxygenated blood to bypass the non-functional fetal lungs.

3. What way does the oxygenated blood return to the heart from the lungs?

A. It flows to the left side through the aortic valve.

B. It flows to the left atrium through the mitral valve.

C. It flows to the left atrium and through the mitral valve to the left ventricle.

D. It flows through the aorta into the left atrium.

4. What is the role of the vena cava in the circulatory system?

A. The vena cava serves as the major vein returning deoxygenated blood from the body to the right atrium.

B. The vena cava completes the circulatory loop by connecting the heart and the lungs.

C. The vena cava facilitates the exchange of gases, nutrients, and wastes at the cellular level.

D. The vena cava works in conjunction with the aorta to maintain the heart's efficient pump function.

5. What ensures the heart’s ability to effectively contract?

A. The myocardium especially that of the left ventricular walls.

B. The presence of the protective pericardium.

C. The division of the heart's right and left sides by the septum.

D. The integration of the semilunar valves within the heart's structure.

6. What is the primary function of the capillaries within the cardiovascular system?

A. To carry oxygenated blood away from the heart to the body.

B. To return deoxygenated blood from the body to the heart.

C. To provide the exchange of gases, nutrients, and wastes at the cellular level.

D. To ensure the precise rhythm essential for effective blood circulation.

7. Which layer of the heart wall is responsible for providing a smooth surface for blood flow?

A. The pericardium.

B. The myocardium.

C. The endocardium.

D. The septum.

Ex. 6. Below you can see a short summary of the text about the structure of the human heart. But the second halves of the sentences are scrambled. Unscramble the sentences and restore the summary. Write it down into your notebook.

1. The human heart, located in the thoracic cavity, ***[****for the venous blood to be pumped into the pulmonary trunk and further to the lungs.****]***

2. The right and left atria receive blood and are situated above ***[****which prevent backflow of blood into the ventricles.****]***

3. The tricuspid valve regulates blood flow between the right atrium and the right ventricle, ***[****the left ventricle, wherefrom the blood is pushed into the aorta.****]***

4. The mitral valve lets the oxygen-rich blood flow from the left atrium into ***[****is a conical four-chambered organ.****]***

5. The heart septum prevents the mixing of oxygenated and deoxygenated blood, ***[****the larger, muscular lower chambers called the right and left ventricles.****]***

6. The heart structure includes semilunar valves, such as aortic and pulmonary valves, ***[****which ensure blood movement throughout the body.****]***

7. The heart is the core of an intricate network of vessels, including arteries, veins, and capillaries, ***[****while the vena cava serves as the major vein returning deoxygenated blood to the right atrium.****]***

Develop your Vocabulary

Ex. 7 A. Match the words on the left with their synonyms on the right. For better understanding see Text A above (p. 50).

1.	simultaneously	a)	unbelievable
2.	precise	b)	perfect, ideal
3.	flawless	c)	vital, life-saving
4.	tirelessly	d)	accurate, exact
5.	incredible	e)	at the same time, concurrently
6.	life-sustaining	f)	without rest, endlessly

To do the exercise quicker, use the QR-link below (Fig. 41).

Fig. 41. Heart Exercise 7 A QR

Ex. 7 B. Use the derivatives of some of the words from the right column to fit into the gaps.

Model: The heart's base rests **…** against the third rib. (precise) => The heart base rests ***precisely*** against the third rib.

1. The heart is the most important inner organ, which … … . (life-sustaining)
2. The four heart chambers perform different functions but their contraction is … . (simultaneously)
3. In case of heart failure, the risk of death is … high. (incredible)
4. Oh, I am …, my beats per minute are 120. (tirelessly)
5. She's so beautiful, she seems to have no …, but she's got a heart of stone. (flawless)

Ex. 7 C. Match the words on the left with their antonyms on the right. For better understanding see Text A above (p. 50).

1. multiple	a) far from
2. intricate	b) minor
3. oxygenated	c) easy, simple
4. robust	d) oxygen-poor
5. adjacent	e) one, few
6. major	f) weak

To do the exercise quicker, use the QR-link below (Fig. 42).

Fig. 42. Heart Exercise 7 C QR

Ex. 7 D. The statements below are false because they contain words with the opposite meaning. Find which word should be changed for its antonym. Change the word and make the statements true.

1. The human heart is a weak organ.
2. The vena cava is located far from the heart.
3. The foramen ovale plays a minor role in the fetal development.

4. Oxygen-poor blood is pumped through the aortic valve.
5. Due to its simple structure the heart performs one function.

Ex. 8. Translate parts of the sentences without a dictionary using the vocabulary of the lesson.

1. The heart comprises *(смежные камеры)* that fulfill distinct roles in *(кровообращение)*.
2. *(Правое предсердие)* receives *(дезоксигенированную кровь)*, which first gets into *(правый желудочек)* and is then *(проталкивается)* into *(малый круг кровообращения)* through *(легочный клапан)* to undergo *(процесс обогащения кислородом)*.
3. *(Два предсердия)* and two ventricles *(расширяются и сужаются одновременно)*, which we perceive as *(удары в минуту)*.
4. The aorta *(- это основная артерия)* distributing *(обогащенную кислородом кровь по всему организму)*, and *(верхняя и нижняя полая вена)* is *(основная вена)* returning *(дезоксигенированную кровь)* into the heart.
5. *(Овальное окно)* which is present in *(межпредсердной перегородке)* of the fetus's heart usually closes soon after birth.
6. The heart *(безустанно)* pumps blood *(по всему организму)* to perform its *(функцию жизнеобеспечения)* with *(безупречной точностью)* and efficacy.
7. Besides arteries and veins, *(сложная сеть сосудов)* incorporates *(капилляры)*, which *(обеспечивают обмен)* of gases, *(питательными веществами)* and wastes at the cellular level.

STUDENT INDEPENDENT WORK

Ex. 9. Medical texts in English contain many *-ing*-forms, both Present Participles and Gerunds, as well as Past Participles, like *-ed*-forms (*considered*) or V_3-forms (*taken, brought*). Look through the information about the cardiovascular system (till Coronary Circulation) using the QR-link below (Fig. 43).

Fig. 43. Kenhub Circulatory System QR [37]

Write out the examples of the participles used in this text distributing them in the table boxes according to their role in the sentence (Table 6).

Table 6

The role of English Participles in the Sentence

Roles defined in Russian	Present Participle (-ing)	Past Participle (-ed or V_3)
Attribute before noun	*e.g., the **decreasing** heartbeat*	*e.g., the **decreased** heartbeat*
Predicate (meaningful part)	*e.g., the heartbeat is **decreasing***	*e.g., the heartbeat is **decreased***
Part of Complex Object	*e.g., It'll make **your heartbeat decreasing** gradually*	*e.g., I feel your heartbeat **decreased***
Participial phrases	*e.g., the medicine **decreasing the heartbeat***	*e.g., the heartbeat **decreased by this medicine***

LESSON 2. THE STRUCTURE OF THE BLOOD CIRCULATORY SYSTEM

Sound Focus

Ex. 10. Pronounce the groups of family words correctly. Pay attention to the stress and pronunciation.

atrium – **a**trial; **ven**tricle – ven**tri**cular; **ar**tery – ar**ter**ial; ca**ro**tid / ca**ro**toid; **ve**in – **ve**nous; **arch** –**arch**ing – **arch**ed; **branch** – **branch**ing – **branch**ed; **blood** – **bleed**ing; **cir**culate – circu**la**tory – circu**la**tion; **sys**tem – sys**tem**ic; **ves**sel – **vas**cular; **ab**domen – ab**do**minal; a**or**ta – a**or**tic; **pul**monary – pul**mon**ic; **o**xygen – **o**xygenated – de**o**xygenated – oxyge**na**tion; con**tract** – contrac**tile.**

Ex. 11 A. Using the QR-code in Figure 44, study different types of arteries and veins of the human circulatory system, listen to their pronunciation, and repeat after the speaker.

Fig. 44. Cardiovascular System 3-D Model QR [38]

Ex. 11 B. Use the QR-code below and solve the crosswords (Fig. 45).

Fig. 45. Heart Lesson 2 Exercise 11 B QR

Grammar Focus

Ex. 12 A. Sometimes English learners tend to confuse prepositions and articles. Yet, each preposition has its own specific meaning, it is a meaningful word, and in

most cases it ***can be translated into Russian***. An article has a very broad meaning, that of something indefinite *(a, an)* or something definite *(the)*, and usually it ***is not translated into Russian***. Review Table 7 below.

Table 7

Prepositions vs. Articles

Examples of prepositions	Examples of articles
In, into, out, on, under, to, towards, from, between, above, below, down, up, of, off, inside, outside, with, without, … The septum is ***between*** the ventricles.	***a: A*** vein is ***a*** vessel. ***an: An*** artery is ***a*** vessel**.** ***the: The*** aorta is ***the*** main artery *of* ***the*** human body**.**

Ex. 12 B. Study the blood flow through the main vessels in Figure 46 below. Do the task that follows.

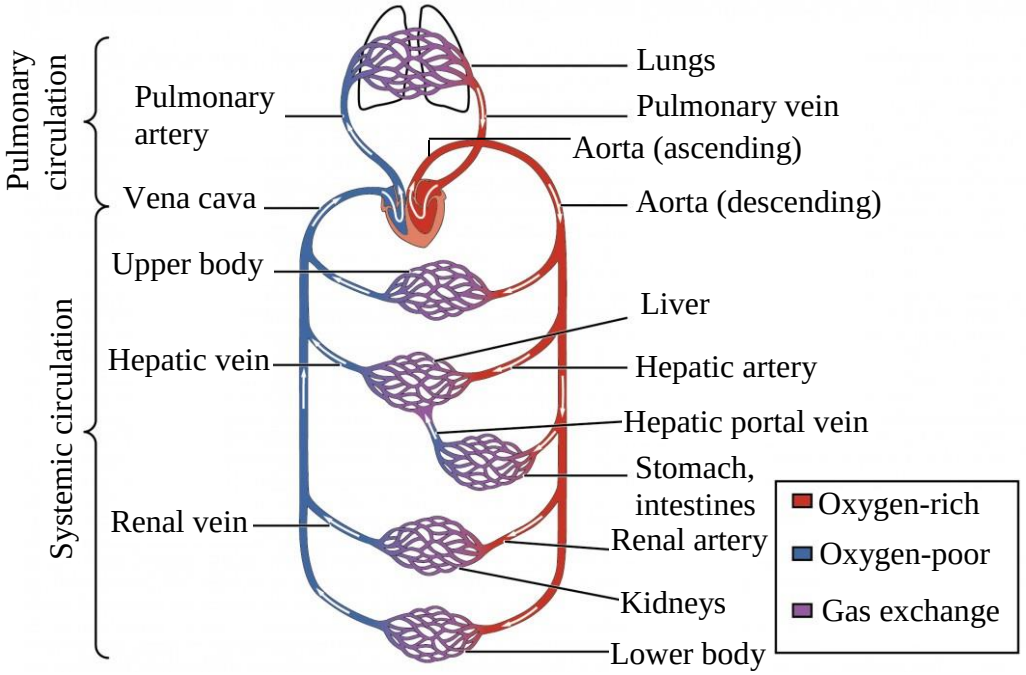


Fig. 46. Blood Flow and Major Bodily Vessels [39]

Fill in a preposition or an article in the gaps below if required. Choose either a preposition, or an article from the brackets to fill in the gap. Sometimes two variants are possible.

Text B

The human body relies _ *(on, for, to)* a network _ *(off, of, the)* systemic vessels to transport blood. _ *(The, In, From)* systemic circulation, oxygenated blood is delivered _ *(through, by, from)* the heart _ *(to, the, into)* organs and tissues _ *(by, via, the)* arteries. It starts _ *(as, from, with)* the ascending aorta, which goes_ *(down, back, up)*, arches and runs_ *(through, down, along)* as the descending aorta, consisting_ *(of, from, out of)* the thoracic and abdominal sections, which further distribute blood _

(through, to, the) such big arteries as hepatic, renal, iliac and femoral. The carotid artery supplies _ *(with, the, –)* brain _ *(the, with, by)* oxygenated blood, while coronary arteries nourish _ *(by, into, the)* heart muscle itself. Arteries then branch _ *(onto, into, to)* smaller ones called arterioles and finally _ *(the, into, between)* capillaries. Capillaries are crucial _ *(to, for, –)* exchanging gases, nutrients, and waste products _ *(between, among, by)* blood and cells. _ *(Before, After, With)* this exchange, the blood becomes deoxygenated and is returned _ *(into, to, from)* the heart _ *(the, by, with)* veins, beginning _ *(with, at, an)* venules that merge _ *(the, into, as)* larger vessels. The largest veins, the superior vena cava and inferior vena cava, return blood _ *(to, with, at)* the right atrium _ *(of, over, in)* the heart. Each vessel has _ *(–, of, the)* three layers: the tunica intima, tunica media, and tunica externa. These enable arteries to constrict and dilate, adapting _ *(to, the, with)* changes _ *(of, at, in)* blood flow and pressure as high-pressure vessels. Conversely, veins are low-pressure vessels equipped _ *(with, the, via)* valves to prevent backflow.

What two other subtypes of vessels have you learned about from the text?
What two movements do vessels make?

Ex. 13 A. Study Table 8.

Table 8

Forms of Comparison of Adjectives and Adverbs

Positive	Comparative	Superlative
One or two syllable[4] words		
thin	thinner	(the) thinnest
thick	thicker	(the) thickest
dry	drier	(the) driest
Polysyllabic words		
frequent	more frequent	(the) most frequent
Irregular forms		
good	better	(the) best
bad	worse	(the) worst
far	farther (distance) further (order)	(the) farthest (the) furthest
little	less	(the) least
Comparative Models		
The walls are ***as*** thick ***as*** the bottom.	The walls are thick***er than*** the bottom.	It has the thick***est*** wall ***of all the vessels.***
The width is ***twice as*** big ***as*** the length.	The width is ***twice*** bigg***er than*** the length.	The aorta is the bigg***est*** vessel ***in the body***.

Ex. 13 B. Compare the organs of the human circulatory system using the models from Table 8 and the prompts.

1. The heart	big, in adults, in children
2. The left atrium	thick, myocardium, the right atrium
3. The right ventricle	thin, walls, much, the left ventricle

[4] Syllable – слог

4. The aorta	large, artery, the body
5. The vena cava	important, vein, carry, venous blood
6. The systemic circuit	long, considerably, the pulmonary circuit
7. Arterioles	small, arteries, major
8. Veins	low, pressure, arteries, ten times
9. Capillaries	tiny, vessels, circulatory system
10. The portal venous system	little, oxygenated, arterial blood
11. Tricuspid valve	wide, mitral valve

STUDENT INDEPENDENT WORK

Ex. 14. Summarize the information from Lesson 2 based on Text B and Figure 46. Follow the steps:

1. Make a plan of your summary of no more than 4 points.
2. Write out at least 3 key words/phrases for each point of the plan (see some words below).
3. Write one-two sentences on each point of your plan.
4. Add some link words.
5. Rehearse to present in class.

Blood vessels: the ascending/descending aorta; arteries carrying oxygenated blood; deoxygenated blood returned by veins; the superior vena cava; the inferior vena cava; to branch into capillaries; gas exchange; to be equipped with valves; to prevent backflow.

Ex. 15. Make a Disease Profile for Ventricular Septal Defect according to the following plan: 1) cause; 2) signs and symptoms; 3) diagnosis methods; 4) treatment/management; 5) complications (if any). Use the QR-link below (Fig. 47) to learn about this disease.

Fig. 47. Ventricular Septal Defect QR [40]

LESSON 3. BLOOD CIRCULATION

Word Formation

Ex. 16 A. Review Table 9 below.

Table 9

Greek and Latin Parts of Anatomical Cardiovascular Terms

Word part	Definition	Examples with meaning
cardi(o)	Associated with the heart	Peri**cardi**um – the outer protective sac of the heart Endo**cardi**um – the inner membrane of the heart

End of the Table 9

Word part	Definition	Examples with meaning
vas(o), vascul(o)	Associated with vessels	Vasodilation – widening of vessels Vascularization – appearing of a vessel network
angi(o)	Associated with vessels	Angiography – X-ray examination of vessels
aort(o)	Associated with the aorta	Aortitis – inflammation of the aorta
arter, arteri(o)	Associated with arteries	Arterioplasty – surgical reconstruction of an artery
arteriol(o)	Associated with arterioles	Arteriolitis – inflammation of arterioles
ven(o), ven(i)	Associated with veins	Venoconstriction – narrowing of a vein
varic(o)	Associated with swollen veins	Varicosis – a condition in which the veins are abnormally and constantly dilated
phleb(o)	Associated with veins	Phlebitis – inflammation of a venous wall

Ex. 16 B. Guess the terms by their definition using Table 9 above and the information from the previous lessons. To do it quicker, scan the QR-link and solve the crosswords (Fig. 48). Translate the terms.

Fig. 48. Heart Lesson 3 Exercise 16 B QR

1. Inflammation of the inner layer of the heart, the ***endocardium***.
2. Inflammation of the cardiac muscle, the ***myocardium***.
3. Inflammation of blood vessels.
4. Narrowing of a blood vessel.
5. Widening of veins.
6. Inflammation of a venous wall associated with one or more blood clots (***thrombus***).
7. A sclerotic disease damaging arteries, synonym: ***atherosclerosis***.
8. An angioplasty procedure for conditions affecting veins.
9. The radiographic visualization of the heart and its blood vessels.
10. A medical specialist performing operations on blood vessels.

Ex. 17. Read the text about ***systemic circulation*** changing the words in brackets for their family words to suit the context. Write out the pairs of family words.

Learn the new words to enrich your Medical English vocabulary:

Dispatch [dɪˈspætʃ] – отправлять;
Absorb [əbˈzɔːb] – впитывать, всасывать;
Exhalation [ekshəˈleɪʃən] – выдох.

Text C

Blood (CIRCULATE) is initiated when the heart (RELAXATION) between beats. Blood flows from the (ATRIAL) to the ventricles, which subsequently (DILATION). Thereafter, both (VENTRICULAR) propel blood into major

(ARTERIAL). In (SYSTEM) circulation, (OXYGEN) blood is dispatched from the left ventricle into the (AORTIC). The blood travels through larger and smaller arteries before reaching minute (VASCULAR) known as capillaries. At this juncture, the blood (DELIVERY) oxygen and nutrients to (BODY) tissues while simultaneously removing carbon dioxide and waste products. The deoxygenated blood is collected in (VENOUS) and transported to the right atrium and (SUBSEQUENT) to the right ventricle.

Grammar Focus

Ex. 18 A. Study Table 10. Revise the meaning and role of the Present Participle (*-ing* forms) in the sentence with the teacher.

Table 10

Forms of Present Participle (Participle I)

Form	Active	Passive
Simple	carrying, putting	being carried, being put
Perfect	having carried, having put	having been carried, having been put

Ex. 18 B. Read the text about ***pulmonary circulation***. 2 sentences may be rephrased using Present Participles. Rephrase the sentences.

Text D

Pulmonary circulation starts at this point: The right ventricle propels deoxygenated blood into the pulmonary artery. *It then branches into smaller arteries and capillaries that surround the alveoli in the lungs.* Here, fresh oxygen is absorbed. *At the same time, carbon dioxide is expelled from the blood, and then exits the body upon exhalation.* Oxygenated blood then travels through the pulmonary veins to the left atrium and subsequently to the left ventricle. The next heartbeat restarts the cycle.

Ex. 19. Choose the right option to complete the sentence. Think of the difference between Present Participle (-ing form) and Past Participle (-ed or V_3 form). Use the QR-link to do the task quicker (Fig. 49).

Fig. 49. Heart Lesson 3 Exercise 19 QR

1. The blood that has passed through systemic circulation is considered …
a) Deoxygenated b) Deoxygenating c) Deoxygenation
2. …expelled from the blood, carbon dioxide exits the body upon exhalation.
a) Having b) Having being c) Having been

3. Pulmonary circulation starts with the right ventricle … blood into the pulmonary artery.

a) Propelling b) Propelled c) Propels

4. … the ventricles propel blood into major arteries.

a) Having contracted b) Contracting c) Having been contracted

5. … in the veins the oxygen-poor blood is transported to the right atrium.

a) Been collected b) Being collected c) Having collected

6. The oxygen-rich blood … from the left ventricle gets into the aorta.

a) Dispatched b) Dispatching c) Having dispatched

7. … in the lungs in the course of pulmonary circulation fresh oxygen is delivered by blood to organs and tissues.

a) Having absorbed b) Absorbing c) Having been absorbed

8. … by the liver blood from the portal venous system enters the inferior vena cava to be carried to the right atrium.

a) Filtering b) Filtered c) Been filtered

Ex. 20 A. Read the explanation below.

The Present Continuous Tense is one of the present tenses in English. It refers to the action that is in progress at the present moment, i.e. here and now. However, this moment may be understood quite broadly, i.e. nowadays, or in present days, and so the verb will denote a changing situation in general.

For instance,

*More and more people **are presenting** with cardiovascular disorders nowadays.*

Moreover, two actions can be in progress at the same time, one happening at the moment the other is happening too. In this case, the sentences contain such words as ***while*** and ***as (по мере того, как; когда), meanwhile*** and ***whereas (в то время, как; а в это время)***. For instance,

***While** the left part of the heart **is pumping** oxygenated blood into the systemic circulation, the right chambers **are propelling** deoxygenated blood into the pulmonary circuit.*

The forms of the Present Continuous can be both Active and Passive.

*As arteries **are carrying** **(Active)** arterial blood from the heart to inner organs, venous blood **is being carried** **(Passive)** back to the heart by veins.*

The Present Continuous tense is contrasted to the Present Simple tense, which denotes an action happening regularly, which is understood as a rule or law. However, in medical contexts it may depend on whether you put an accent on the progress of action, or on the regularity of a physiological process. For instance,

*Arteries **carry** arterial blood, whereas venous blood **is carried** by veins.*

Ex. 20 B. The right and left chambers of the heart are known to relax and contract simultaneously. So, the pathway of blood in the heart can be described using the Present Continuous tense. Open the brackets in the sentences, reflecting the phases of the cardiac cycle. Remember there are active and passive forms. Find three places, where Present Simple must be used.

Before you start, study the new words and enrich your Medical English vocabulary:

to shunt blood – отводить кровь

to drain blood – пропускать кровь

to recommence – начинать, начинаться заново

Use the QR-link to do the task quicker (Fig. 50).

Fig. 50. Heart Lesson 3 Exercise 20B QR

1. ***As*** the open tricuspid valve (to shunt) blood into the right ventricle, the mitral valve (to open) by the blood flow from the left atrium to let the blood in the left ventricle.

2. ***While*** the ventricles (to start) to contract, the blood flow (direct) back towards the atria, which (to make) the atrioventricular valves close.

3. ***While*** the oxygen-poor venous blood (to flow) into the right atrium from the venae cavae, the oxygen-rich blood (to drain) via the pulmonary veins into the left atrium.

4. ***Whereas*** the ventricular contraction (to continue), the oxygenated blood (to pump) into the aorta through the aortic valve, and the deoxygenated blood (to eject) into the pulmonary trunk through the pulmonic valve.

5. Here one cardiac cycle (to end), and the new one (to recommence).

6. Both the atria (to contract), ***meanwhile*** the atrial blood (to push) into the right and left ventricle respectively.

Ex. 21. The sentences in exercise 20 B do not represent the correct sequence of the phases of the cardiac cycle. Put them into the correct order according to the existing phases. Translate the sentences. Use the QR-link to do it quicker (Fig. 51).

Fig. 51. Heart Lesson 3 Exercise 21 QR

For better understanding of the phases see Figure 52.

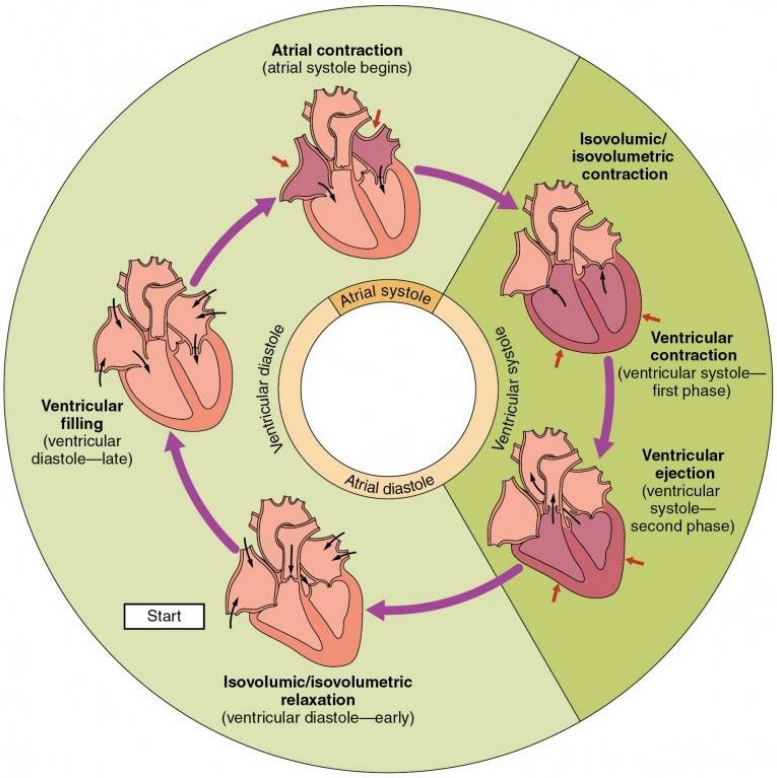


Fig. 52. Phases of Cardiac Cycle [41]

Text Translation

Ex. 22 A. Read the text. Think over the translation of the ***words in bold italics***. **Do not use a dictionary, or a translation application!!!** Work in small groups of 3–4 students. Take turns to translate the text.

Text E

Ventricular Septal Defect

A ventricular septal defect (VSD) is usually a congenital defect in the ventricular septum, the wall dividing the left and right ventricles of the heart. The diameter of the opening proves to vary from pin size *to* ***complete*** absence of the ventricular septum, creating one common ventricle.

Being most often symptomless at birth, a ventricular septal defect usually manifests a few weeks after birth. *The most common manifestations include a murmur along the lower left sternal border heard on auscultation and a palpable turbulence of blood flow felt on palpation.** An infant with a large VSD is likely to ***present with*** failure to thrive[5] and will become sweaty and tachypnoeic (breathe faster) with ***feeds***. In serious cases, the pulmonary arterial pressure can reach levels equaling the systemic pressure. This reverses the left-to-right ***shunt***, so that blood then flows from the right ventricle into the left ventricle, resulting in cyanosis, as blood is by-passing the lungs for oxygenation.

Smaller congenital VSDs often close on their own, as the heart grows, and in such cases may be treated conservatively. Some cases may ***necessitate*** surgical

[5] failure to thrive – отставание в физическом развитие, отсутствие прибавки в весе.

intervention, *i.e.* with the following indications: a VSD with pulmonic stenosis, a large VSD with pulmonary hypertension, a VSD with aortic regurgitation. Ventricular septum defect in infants is initially treated medically with cardiac glycosides, loop diuretics and ACE[6] inhibitors.

Ex. 22 B. Do the tasks and add information to your ***Translation Tips:***

1. Write out the sentence marked with an asterisk (*) leaving the space above the lines. Find and underline the Subject (подлежащее), the Verb Predicate (сказуемое), and the Participial Attributes (определения, выраженные причастиями) and the words they are attributed to. Write the translation with a pen of a different color above each of these words.
2. Find all the cases of *-ing* words in the text. Make sure you've translated them correctly.
3. Find 2 sentences with Complex Subject in the text. Make sure you've translated them correctly.
4. Note down the correct translation of the acronym ***VSD***.
5. Is the italicized '*to*' a preposition (предлог) or the infinitive particle (частица)? What is the translation for it?
6. Define the part of speech of the words in ***bold italics.*** Note down their translation in this context and their possible translations in different contexts.

STUDENT INDEPENDENT WORK

Ex. 23 A. Get ready to speak about the structure and functions of the human cardiovascular system. Make 12–15 sentences. Follow the plan:

1. The position and shape of the human heart (1–2 sentences).
2. The structural composition of the human heart (4–5 sentences).
3. The role of the heart valves (2–3 sentences).
4. The three major types of vessels and their roles (2–3 sentences).
5. The difference between the systemic and pulmonary circulation (1–2 sentences).
6. Make a conclusion on the role of the human heart (1 sentence).

Ex. 23 B. Use the QR-link to learn about the condition called Patent Foramen Ovale (Fig. 53). Make a Disease Profile according to the following plan: 1) cause; 2) signs and symptoms; 3) diagnosis methods; 4) treatment/management; 5) complications (if any). Make sure you know the translation of all the words in your profile.

Fig. 53. Patent Foramen Ovale QR [42]

Ex. 24. Use the QR-link at the next page (Fig. 54) to familiarize yourself with the terms of the Human Respiratory System.

[6] ACE (angiotensin-converting enzyme) – АПФ (ангиотензин-превращающий фермент).

UNIT 4. HUMAN RESPIRATORY SYSTEM

Introduction

Think what is the first thing any person does in their life. The very first action you take when you are born is … Breathing! Taking your first breath seems easy; however it involves remarkable coordination of numerous systems in your body, which hasn't been fully understood so far despite investigations. Clearly, the core of this is the functioning of your respiratory system.

Introductory Task

Study the interactive 3-D model available through the QR-link below (Fig. 54) to see what organs compose the system. Practise saying the English terms naming the elements of the human respiratory system using the tools. Provide the Russian equivalents for them.

Fig. 54. Respiratory System 3 D Model QR [43]

Essential Vocabulary

Nouns: the lungs, the trachea (the windpipe), the epiglottis, bronchus – bronchi, bronchiole, alveolus – alveoli, mucus, passageways, airways, the pharynx, the larynx, the laryngopharynx, cilia, the membrane, the bronchial tree, sacs, gas exchange, lobes, lobules, the mediastinum, the pleura, breath, breathing, inhalation, inspiration, exhalation, expiration, respiration, ventilation, fluid.

Verbs: to breathe (in/out), to inhale, to exhale, to inspire, to expire, to inflate, to deflate, to line, to trap, to expand, to extend, to stretch, to branch (into), to surround, to encase, to secrete, to constitute, to comprise, to appreciate, to moisten, to swallow, to conduct.

Adjectives (Participles): respiratory, visceral, pulmonary, mucous, serous, C-shaped, fibroelastic, primary, bronchial, laryngeal, pharyngeal, tracheal, alveolar, multiple-branched, tiny, effortless.

Adverbs: evidently, closely, upward, downward, rhythmically.

Essential Grammar

Gerund, Complex Object

LESSON 1. ORGANS AND FUNCTIONS OF THE RESPIRATORY SYSTEM

Sound Focus

Ex. 1.A. Remember the pronunciation:

ire/ira [aɪə]: t**ire**d, f**ire**, resp**ire**, insp**ire**, exp**ire**, resp**ira**tory, des**ire**
ira+tion [ɪreɪʃn]: resp**iration**, insp**iration**, exp**iration**
ch [k]: chemistry, tra**ch**ea, bron**ch**us, bron**ch**iole, bron**ch**itis
us – i [əs - aɪ]: bronch**us** – bronch**i**; alveol**us** – alveol**i**; bacill**us** – bacill**i**
ea [e] – ea [i:]: br**ea**th – br**ea**the, br**ea**thing; d**ea**th, d**ea**d – d**ea**l; l**ea**d (свинец) – l**ea**d (вести); r**ea**dy – r**ea**d, r**ea**ding
! read [ri:d] *(infinitive, present simple)* – read [red] *(past simple, past participle)*

Ex. 1.B. Practise the pronunciation and mind the stress in the following words:

Res**pir**atory; **na**sal; **car**bon **di**oxide; C[si]-**sha**ped **car**tilages; **mu**cous **mem**brane; media**sti**num; **li**ning; **di**aphragm [ˈd**aɪ**əfræm]; a **se**crete [ˈs**ɪ**krɪt**]** – to se**cre**te **[**səˈ**kri:**t**]**; a **de**crease – to de**crease**; an **in**crease – to in**crease**; **con**duct – to con**duct**.

Before you read

Ex. 2. Work in small groups of 3–4 students.

1. Hold your breath. Really! See how long you can hold your breath as you continue reading. … How long can you do it? Chances are you are feeling uncomfortable already. A typical human cannot survive without breathing for more than 3 minutes, and even if you wanted to hold your breath longer, your autonomic nervous system would take control. Why is it so? Discuss in groups.

2. Take a deep breath. Then breathe out slowly. Think, what muscles take part in breathing? Are they voluntary or involuntary? Can you change the rapidness of breathing? Discuss in groups.

Enrich your Medical English vocabulary

Ex. 3. Read and translate the words, word combinations and phrases.

respiratory [rɪˈspɪrətri, -ˈspaɪə-]: respiratory system; respiratory organs; respiratory surface; respiratory failure; respiratory tree; **respiration**; accelerated respiration; the respiration cycle

visceral [ˈvɪsərl]: visceral layer; visceral organs; the viscera; visceral surface; visceral system

pharynx [ˈfærɪŋks], **larynx** [ˈlærɪŋks]: pharynx and larynx are conducting respiratory organs; pharyngeal; laryngeal; laryngopharynx

epiglottis [ˌepɪˈglotɪs]: epiglottis closing the trachea opening

trachea [trəˈkiːə]: the posterior surface of the trachea; tracheal; trachealis muscle; trachea is the passageway for air

inhalation [ˌɪnhəˈleɪʃn], **exhalation** [ˌekshəˈleɪʃn]: inhalation is followed by exhalation; through exhalation; upon inhalation

bronchus [ˈbroŋkəs], **bronchiole** [ˈbroŋkiəʊl]: a bronchus – bronchi [ˈbroŋkaɪ]; a bronchiole – bronchioles; bronchi branch; the primary right/left bronchus; the tiniest bronchioles; bronchial tree

alveolus [ˌælviˈoʊləs]: an alveolus – alveoli; the alveolar abscess; grape-like sacs called the alveoli

lobe [loʊb]: the right lung has three lobes; the two lobes of the left lung

mediastinum [ˌmiːdiəˈstaɪnəm]: the lungs are separated by the mediastinum; the heart is located in the mediastinum

cilia [ˈsɪliə]: cilia are hair-like; cilia line the airways; tiny, yet vital, cilia; cilia beat rhythmically

pleura [ˈplʊərə]: the pleura reduces friction; encased ***by*** the pleura; covered ***with*** pleura

Time to read

Ex. 4. Read the text silently. Entitle it. Guess the words in bold from the context. Use Figure 55 below as a guide.

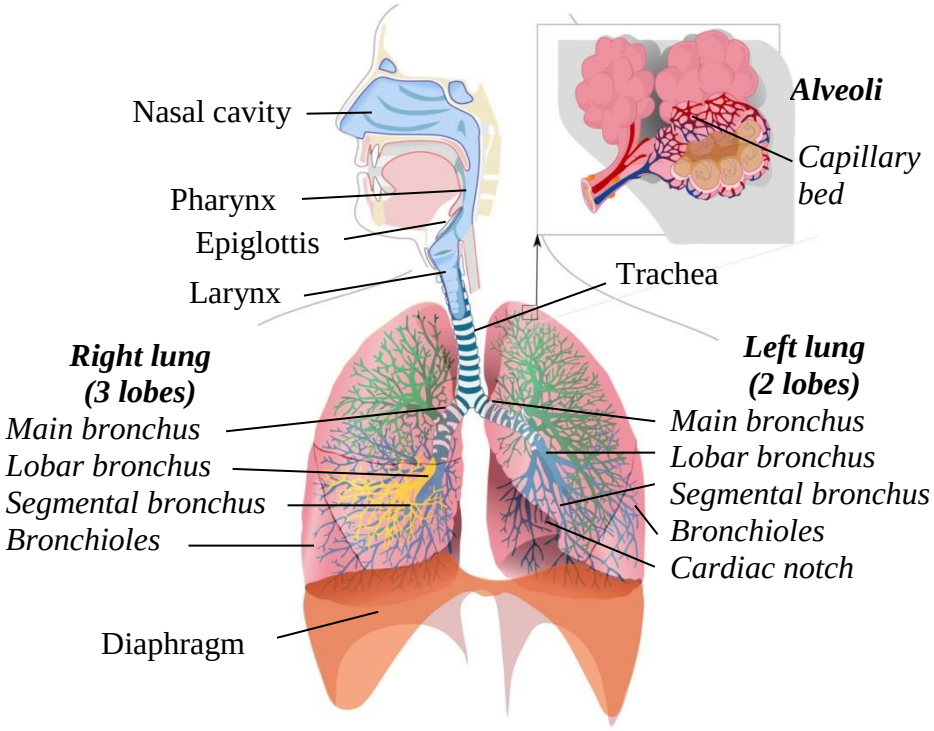


Fig. 55. Respiratory Tract [44]

Text A

The human respiratory system is a visceral system responsible for obtaining oxygen and getting rid of carbon dioxide, and aiding in speech production and in sensing odors. The journey of air begins at the nasal cavity, where it is moistened and filtered. The mucous membrane lining the nasal cavity traps dust and other particles,

protecting the delicate structures within the system. The air first travels down the pharynx, then through the larynx, and finally into the trachea, which carries it to the lungs. The act of swallowing causes the pharynx and larynx to lift upward, allowing the pharynx to expand and the epiglottis of the larynx to swing downward, closing the opening to the trachea. These movements prevent food and beverages from entering the trachea.

The trachea, or windpipe, extends from the larynx towards the lungs. It is formed by C-shaped cartilage rings, serving as the main passageway for air towards the lungs. The trachealis muscle and elastic connective tissue together form the fibroelastic membrane, a flexible membrane that closes the posterior surface of the trachea, connecting the C-shaped cartilages. The fibroelastic membrane allows the trachea to stretch and expand slightly during inhalation and exhalation, whereas the rings of cartilage provide structural support and prevent the trachea from collapsing.

The trachea branches into the primary right and left bronchus, directing the airflow into the respective lungs. The bronchi continue to branch into a bronchial tree. A bronchial tree (or respiratory tree) is the collective term used for these multiple-branched bronchi. The main function of the bronchi is to provide a passageway for air to move into and out of each lung.

As the bronchus enter the right lung and left lung, they further branch into narrower pathways known as bronchioles. These finer airways continue to extend and spread throughout the lung tissue until they end in grape-like sacs called the alveoli. The alveoli are paramount to gas exchange, their walls surrounded closely by numerous capillaries. Here, oxygen diffuses through the alveolar wall into the blood, while carbon dioxide is expelled from the blood into the alveoli, ready to be removed from the body through exhalation.

The lungs are the major organs of the respiratory system. The lungs are paired and separated into lobes. The left lung consists of two lobes, whereas the right lung is bigger and consists of three lobes. The left lung is smaller due to the space limitations created by the heart's position within the chest cavity, specifically in the mediastinum. The lungs are encased by the pleura, a double-layered membrane, which secretes fluid to reduce friction during the breathing cycle.

The process of breathing requires the coordinated action of various muscles and the airways. Tiny, yet vital, structures known as cilia line the airways. These microscopic hair-like projections beat rhythmically to move mucus and trapped particles upwards, preventing potential blockages and infections.

Evidently, the respiratory organs constitute two zones, that is the conducting zone and the respiratory zone. **The former** includes the passageways that conduct the air, the nasal and oral cavities, the laryngopharynx, the trachea, the bronchi and bronchioles. Meanwhile, **the latter** comprises the organs ensuring breathing and gas exchange, the lungs, the tiniest bronchioles and the alveoli. Understanding the balanced coordination within these zones, and the effortless transition between inhalation and exhalation, is crucial for appreciating how life is sustained with each breath we take.

Check your understanding

Ex. 5. Read the text again more attentively and pick the right answer to the questions below.

1. What primary function does the human respiratory system serve?

A. Speech production
B. Obtaining oxygen and removing carbon dioxide
C. Sensing odors
D. Protecting the body from infections

2. What processes does the air undergo at the start?

A. Moistening and filtration in the nasal cavity
B. Trapping in the nasal cavity
C. Filtration and drying in the nasal cavity
D. Saturation in the nasal cavity

3. How do cilia contribute to the respiratory system's functioning?

A. They produce oxygen
B. They create mucus
C. They move mucus and trapped particles upwards
D. They expand the airways

4. What distinguishes the respiratory zone from the conducting zone?

A. The number of organs involved
B. The location within the body
C. The specific functions of gas exchange and air transportation
D. The size of the airways

5. Which structural feature prevents the trachea from collapsing during breathing?

A. Trachealis muscle
B. C-shaped cartilage rings
C. Fibroelastic membrane
D. Mucous lining

6. What allows the trachea to stretch and expand during respiration?

A. The fibroelastic membrane
B. The trachealis muscle
C. The elastic connective tissue
D. The support of C-shaped cartilages

7. Why is the left lung smaller than the right lung?

A. It has fewer blood vessels
B. It is less developed
C. Due to space limitations created by the heart's position
D. It performs fewer respiratory functions

8. What prevents food from entering the trachea during swallowing?

A. Epiglottis closing
B. Larynx contracting
C. Pharynx expanding
D. Trachea narrowing

9. How do alveoli facilitate gas exchange?

A. By producing oxygen
B. Through capillary walls surrounding them
C. By filtering air particles
D. By generating respiratory muscles

Ex. 6. The statements below are false. Make them true.

1. The human lungs are a paired organ, the only one forming the respiratory system.
2. The epiglottis is a cartilage that prevents the air from escaping.
3. The windpipe, or the bronchus, extends from the larynx to the diaphragm.
4. The tracheal C-shaped rings are connected with a rigid tissue that makes it impossible for the trachea to expand.
5. The primary bronchi branch directly into alveoli.
6. The main function of the alveoli is to distribute the air along the lung.
7. The left lung is smaller due to the position of the aorta.
8. The right lung is as wide and long as the left one.
9. Cilia line the respiratory organs beating rhythmically and pushing debris down into the stomach.

Develop your vocabulary

Ex. 7. Choose the best phrase to replace the bold phrase in the sentence.

1. **The inhaled air is moistened** and filtered in the nasal cavity.
   A. The air is breathed out and gets wet
   B. The moist air is breathed in
   C. The air is breathed in and gets wet
   D. The air to be breathed in must be wet
2. The mucous membrane **lines the nasal cavity**.
   A. draws lines in the nasal cavity
   B. covers the surface of the nasal cavity
   C. looks lined with the nasal cavity
   D. goes in line with the nasal cavity
3. **The act of swallowing** causes expansion of the pharynx.
   A. When you swallow, it…
   B. When you swell, it…
   C. When you are swollen, it…
   D. When swallowed, it…

4. The fibroelastic membrane allows the trachea **to stretch and expand slightly.**
   A. to get longer and wider a little
   B. to get much longer and thinner
   C. to constrict and extend further
   D. to get a little longer and extended

5. The primary right and left bronchi direct the airflow into **the respective lungs**.
   A. the lungs for respect
   B. the corrected lungs
   C. the lungs at rest
   D. the corresponding lungs

6. The alveolar walls are **closely surrounded by** numerous capillaries.
   A. circled and closed by
   B. closed by round
   C. tightly covered with
   D. closed and covered with

7. Carbon dioxide **is expelled from the blood** into the alveoli.
   A. is removed from the blood
   B. is carrying the blood
   C. is expanded by the blood
   D. is pushed together with the blood

8. The lungs **are encased by the pleura**.
   A. are protected by the pleura covering it
   B. are covered in the pleura
   C. are exposed with pleura
   D. have the case of pleura

9. The pleura **secretes fluid** to reduce friction.
   A. provides some water
   B. is a secrete fluid
   C. produces liquid
   D. is covered with fluid

10. The passageways that **conduct air to the lungs** are called the airways.
   A. produce air for the lungs
   B. provide path and direct air to the lungs
   C. push air up to the lungs
   D. constrict and push air down to the lungs

11. **Tiny, yet vital,** structures known as cilia line the airways.
   A. Thin and life-sustaining
   B. Minute but strong
   C. Small and insignificant
   D. Very small, but very important

To do the exercise quicker and more interactively, use the QR-link below (Fig. 56).

Fig. 56. Lungs Lesson 1 Exercise 7 QR

Ex. 8. Translate parts of the sentences using the vocabulary of this lesson and the previous lessons.

1. The lungs (*это парный орган*) located in (*грудной полости*) and responsible for (*получение кислорода и избавление от углекислого газа*).
2. The human respiratory system (*это система внутренних органов*) including two zones: (*проводящая зона и дыхательная зона*).
3. The upward movement of (*глотка и гортань*) allows (*надгортанник*) to close (*вход в трахею при глотании*).
4. (*Полукольцевые хрящи*) provide (*поддержание структуры*) and prevent (*спадание стенок трахеи*).
5. (*Первичные правый и левый бронхи*) continue (*разветвляться в виде бронхиального или респираторного дерева*).
6. (*Крошечные, но важные*) cilia (*захватывают*) dust and other particles (*и выталкивают их вверх, предотвращая закупорку дыхательных путей*).

STUDENT INDEPENDENT WORK

Ex. 9 Make a list of respiratory organs distributing between the conducting zone and the respiratory zone, choose one organ and describe it in short and specify its function. Use the QR-link to find the necessary information (Fig. 57). Get ready to report in class.

Fig. 57. Organs and Structures of Respiratory System QR [45]

LESSON 2. THE STRUCTURE OF THE HUMAN LUNGS

Sound Focus

Ex. 10. Below you will see a list of words you've studied in the previous lessons. Fulfill the tasks and pronounce the words:

1. Read the words in which the letter combination 'ch' gives the sound [k];
2. Read the words with the sound [aɪ] at the end;

3. Read the words in which ‘g’ gives the sound [dʒ];

4. Read the words in which the letter combination ‘ea’ gives the sound [i:].

Alveoli, gas exchange, entire, fascicle, bronchi, epiglottis, coccygeal, tongue, to breathe, respiratory, phalange, trachea, laryngeal, convergent, oxygen, breathing, to expire, the conduct, pharyngeal, bronchiole, visceral, fluid, muscle.

Can you find other words that can be grouped together according to the rules of their pronunciation?

Grammar Focus

Ex. 11 A. Look at the diagram of the lung anatomy below (Fig. 58). Then read a descriptive paragraph beneath the diagram. Fill in the necessary prepositions in the gaps. Be careful, there are gaps where you need an article, not a preposition! Each gap corresponds to one word.

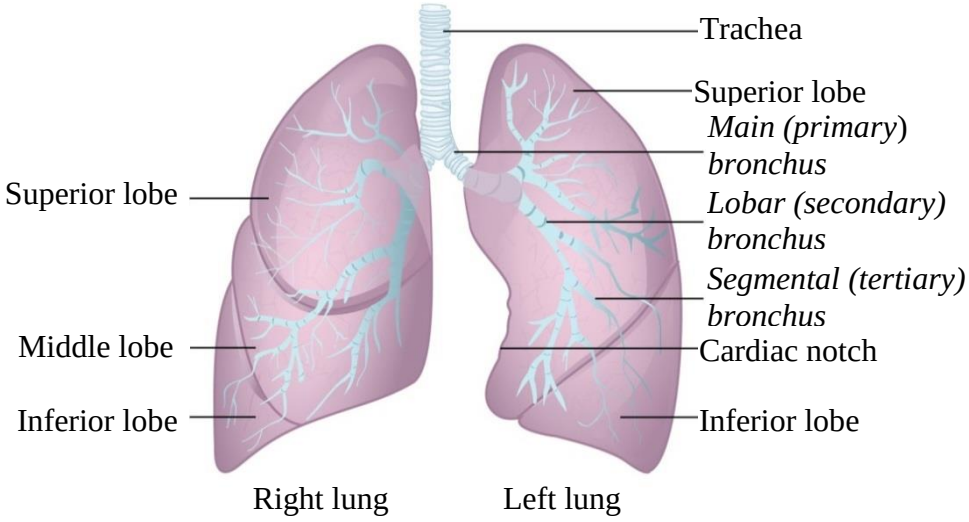


Fig. 58. Anatomy of the Lungs [46]

To do the exercise quicker, use the QR-link below (Fig. 59).

Fig. 59. Lungs Lesson 2 Exercise 11A QR

Text B

The lungs are the main respiratory organs. They are pyramid-shaped, paired organs connected _ the trachea _ the right and left bronchi. _ the inferior surface, the lungs are bordered _ the diaphragm. The diaphragm is the flat, dome-shaped muscle located _ the base _ the lungs and thoracic cavity. Each lung is enclosed _ the pleura, which is attached _ the mediastinum. The right lung is shorter and wider than _ left one, and the left lung occupies a smaller volume than _ right one. The cardiac notch

is _ concave _ the surface _ the left lung, and it allows space _ the heart. The apex _ the lung is the superior region, whereas the base is the opposite region _ the diaphragm. The costal surface _ the lung borders _ ribs. The mediastinal surface faces _ midline. Each lung is composed _ smaller units called lobes. Fissures separate these lobes _ each other. The right lung consists _ three lobes: the superior, middle, and inferior lobes. The left lung is made _ of two lobes: the superior and inferior lobes. A bronchopulmonary segment is a division _ a lobe, and each lobe houses multiple bronchopulmonary segments. Each segment receives air _ its own tertiary bronchus and is supplied _ blood _ its own artery. As the bronchi branch _ bronchioles a pulmonary lobule is formed. An interlobular septum composed _ connective tissue separates lobules _ one another.

Ex. 11 B. Unscramble the questions below and provide answers to them based on the text in exercise 11 A. The answer to one of the questions is not discussed in the text; use your general knowledge in Anatomy to answer it. To make the questions quicker you may use the QR-link (Fig. 60).

Fig. 60. Lungs Lesson 2 Exercise 11B QR

1. body? / the / of / the / shape / is / and / What / in / the / location / lungs
2. size / volume? / right / and / How / and / differ / lungs / do / in / left / the
3. the / makes / mediastinum? / heart / the / in / What / for / space
4. made / three / lung / of / right / or / up / lobes? / Is / the / left
5. each / don't / they? / separate / lobes / other, / the / from / Septa
6. segment / bronchopulmonary / how / it / is / What / a / and / can / function?
7. are / lobules / How / the / another? / from / and / one / pulmonary / separated / formed
8. the / is / enclosed / this / by, / attached? / are / lungs / and / how / structure / What
9. Can / you / the / lung / shorter? / right / why / guess / is

Ex. 11 C. Look at the diagram above again (Fig. 58). Work in pairs or in small groups. Make short conversations, suggesting ideas for the following tasks:

1. Explain why the bronchi have such names: ***main, or primary; lobar, or secondary; segmental, or tertiary***.
2. Try to differentiate between ***lobar pneumonia*** and ***lobular pneumonia*** using the information from the text.

Ex. 12. Review the information in Table 11.

Table 11

Gerund vs. Infinitive: Forms

Gerund	Infinitive
Simple ***Active:*** ***Ving*** ***Passive:*** ***being Ved*** (action presented as a simple process): *breathing, exhaling, being separated*	***Simple*** ***Active:*** ***(to) V*** ***Passive:*** ***(to) be Ved (V_3)*** (an act presented in its initial form): *to breathe, to expire, to be separated*
Perfect ***Active:*** ***having Ved (V_3)*** ***Passive:*** ***having been Ved (V_3)*** (action presented as a completed process): *on having inhaled, on having been expelled from the body*	***Perfect*** ***Active:*** ***(to) have Ved (V_3)*** ***Passive:*** ***(to) have been Ved (V_3)*** (the act presented to have been completed earlier than the other act) *to have expired before, to have been already separated* ***Continuous*** ***Active:*** ***(to) be Ving*** ***Passive:*** ***–*** (the act presented to be in progress during the main action) *He's considered to be inhaling oxygen.* ***Perfect Continuous*** ***Active: (to) have been Ving*** ***Passive:*** ***–*** (the act presented to be in progress for a given period during the main action) *He was considered to have been inhaling oxygen for an hour*

Ex. 13. Choose the right alternative from the brackets using Table 11. Translate the sentences. ***Learn the new word:*** *mucopurulent – слизисто-гнойный.*

1. The lobes of the lungs appear (*to separate, to be separated, separating*) by fissures.
2. (*Understanding, Understand, To be understood*) distinctive features of infants' respiratory physiology is crucial for safe conduct of anaesthesia.
3. Lobular pneumonia is associated with (*having coughed up, coughing up, being coughed up*) mucopurulent sputum.
4. The baby's very cyanotic. He must (*be suffering, have been suffering, suffering*) from respiratory failure for an hour.
5. Apnoea resulted from the airways (*to obstructed, being obstructed, obstructing*) by a cherry stone.
6. He tried to calm down by (*being taken, having taking, having taken*) several deep breaths.

Ex. 14. Review the information in Table 12.

Table 12

Gerund vs. Infinitive: Uses

Gerund	Infinitive
As Subject in a sentence: *Breathing fresh air makes your lungs healthier. – Вдыхание свежего воздуха оздаравливает легкие*	***As Subject in a sentence:*** *To pass the exam is my main goal. – Успешно сдать экзамен – вот моя основная цель*
After prepositions: *On being examined her respiration was 20 breaths per minute. – Во время обследования ее дыхание составляло 20 вдохов-выдохов в минуту.* *He recovered fully only thanks to having undergone a full course of breathing exercises. – Он полностью выздоровел только благодаря тому, что прошел полный курс дыхательных упражнений.* ***After certain verbs (use the QR-link to learn more, Fig. 61):***  *Fig. 61.* Verbs with Gerund or Infinitive QR *The patient resumed breathing after CPR. – Пациент снова начал дышать после СЛР.* ***If necessary, the doer of the action expressed by the gerund is presented with the help of a pronoun in the possessive case (my, his, her, our, their, your, its) or a noun in the possessive case (the patient's).*** *Would you mind **my** measuring your blood pressure. – Вы не против, чтобы **я** Вам измерил(а) давление*	***After modal verbs (must, can, may, should, etc.):*** *His lung ventilation should have improved since the beginning of therapy. – Вентиляция легких у него уже должна была улучшиться с начала лечения.* ***In some clauses and constructions:*** ***Clauses of purpose:*** *He coughed to expel the dust from his throat. – Он покашлял, чтобы прочистить горло от пыли.* ***Attributive clauses:*** *He was the first person to be given this innovative drug. – Он был первым человеком, который получил этот инновационный препарат.* ***The result of the process:*** *The bones fuse to form the sacral crest. – Кости срастаются, образуя (и образуют) крестцовый гребень.* ***Complex Subject:*** *The bones of the cranium are supposed to have fused by the age of 2. – Предполагается, что кости черепа уже срастутся к 2 годам.* ***Complex Object:*** *I expect his lung capacity to have been restored by now. – Я ожидаю, что к настоящему времени объем его легких уже восстановился.* ***After certain verbs:*** *He demanded to be given a pain-killer. – Он потребовал, чтобы ему дали обезболивающее.* ***For-to-infinitive construction:*** *Pressure gradient is important for the lung ventilation to occur. – Градиент давления важен для обеспечения вентиляции легких*
Sometimes, when a verb usually followed by a gerund has an object after it, we must use an infinitive, not a gerund. *I admit having been mistaken. – Признаю, что ошибся (ошиблась).* *I admit **it** to have been done without mistakes. – Признаю, что **это** было сделано без ошибок*	

Ex. 15 A. Read the conversation between Professor Harris and his student Lisa in roles.

Dr. Harris: Right, Lisa, let's ***get down*** to it. I need you to ***explain*** the basic structure of the pleura.

Lisa: Of course, Doctor. Each lung ***is encased*** in a cavity surrounded by the pleura, which is a serous membrane.

Dr. Harris: Very well. The answer you ***have given*** is correct.

Lisa: I'd like to add that the right and left pleurae ***are separated*** by the mediastinum.

Dr. Harris: Now, ***tell*** me about the layers of the pleurae.

Lisa: They ***consist*** of two layers: the visceral pleura covering the lungs and extending into the fissures; and the parietal pleura connecting to the thoracic wall, diaphragm, and mediastinum.

Dr. Harris: Exactly. Now, let me ***ask*** you about the name for the space between these two layers?

Lisa: It ***is*** the pleural cavity.

Dr. Harris: And how does this cavity ***function***?

Lisa: Well, the pleural cavity ***allows*** for the secretion of pleural fluid, which acts as a lubricant, reducing friction during breathing.

Dr. Harris: Perfect ***explanation***, Lisa. You ***have understood*** the pleura's structure and functionality very well. Keep up the great work!

Ex. 15 B. Work in pairs. Let one of you open the QR-link from Table 12 (Fig. 61). Complete the sentences to retell the conversation. Use gerunds or infinitives. The words in ***bold italics*** in the conversation will prompt you.

Dr. Harris suggested …
Lisa mentioned each lung …
Dr. Harris appreciated Lisa's …
Lisa also knew the right and left pleurae …
Dr. Harris demanded …
Lisa acknowledged them …
Dr. Harris continued …
Lisa admitted it …
Dr. Harris asked to explain …
According to Lisa, the pleural cavity proved …
Dr. Harris praised Lisa for …

STUDENT INDEPENDENT WORK

Ex. 16. Use the QR-link and review the article on Acute Respiratory Failure in children. Write down the most important information according to the following plan: 1) definition; 2) causes; 3) signs and symptoms; 4) monitoring.

Fig. 62. Acute Respiratory Failure in Children [47]

LESSON 3. THE PROCESS OF RESPIRATION

Word Formation

Ex. 17 A. Review Table 13 below.

Table 13

Greek and Latin Parts of Anatomical Respiratory System Terms

Word part	Definition	Examples with meaning
(re)spir(o) [respɪ]	Associated with breathing, respiration	**(Re)spiro**meter – a device used to measure the rate of respiration
pulmon(o/no) [pʌlmə]	Associated with the lungs	**Pulmono**logy – a medical specialty that deals with diseases involving the respiratory tract.
pneum(o) pneumat(o) [nju:mə]	Associated with respiration, lung tissue, air or gas	**Pneumo**mycosis – a lung disease caused by a fungus. **Pneumot**osis – gas in the wall of an inner organ, e.g. gastric pneumatosis (in the stomach wall)
pn(o)ea [pnˈi:ə]	Associated with breathing	Dys**pnoea** – abnormal breathing Eu**pnoea** [ju: pnˈi:ə] – normal breathing
oxia [ˈɒksɪə]	Associated with oxygen	Hyp**oxia** – decreased blood oxygen
capnia [kæpnɪə]	Associated with carbon dioxide	Hypo**capnia** – decreased carbon dioxide in the blood

Ex. 17 B. Guess the words by its definition and translate them. The number of letters as well as some prompting letters are indicated in brackets (1 star = 1 letter).

1. Inflammation of lung tissue, which is not necessarily infectious (*n*****it**).
2. An abnormal collection of air in the space between the lung and the chest wall (*n****th*r*x).
3. An increased level of carbon dioxide in the blood of newborns (2 words) (neo***** *y***c*****).
4. A condition in which premature infants stop breathing for more than 15 to 20 seconds (2 words around ‘of’) (***oe* of ***mat***ty).
5. This pressure in the lungs is transient, and it is the difference between the intrapleural and intra-alveolar pressures (tr***p*l****ry pressure).

Ex. 18 A. Look at Figure 63 depicting the process of normal breathing in a person. Study the legend of the diagram. Discuss with a partner what processes take place during inspiration and expiration. Breathe in and out quietly to feel it for yourself and realize the movements of the organs taking part in respiration. Express your feelings making sentences according to the model.

Model: I feel my chest expanding.

Before you start study some new words and enrich your Medical English vocabulary.

to inflate [ɪnˈfleɪt] – надувать, надуваться
to deflate [dɪˈfleɪt] – сдувать(ся), спадаться (*о легком*)
to force out ['fɔ:s'aut] – выталкивать(ся), вытеснять(ся)
to draw in ['drɔ:'ɪn] – втягивать (*напр. воздух*)

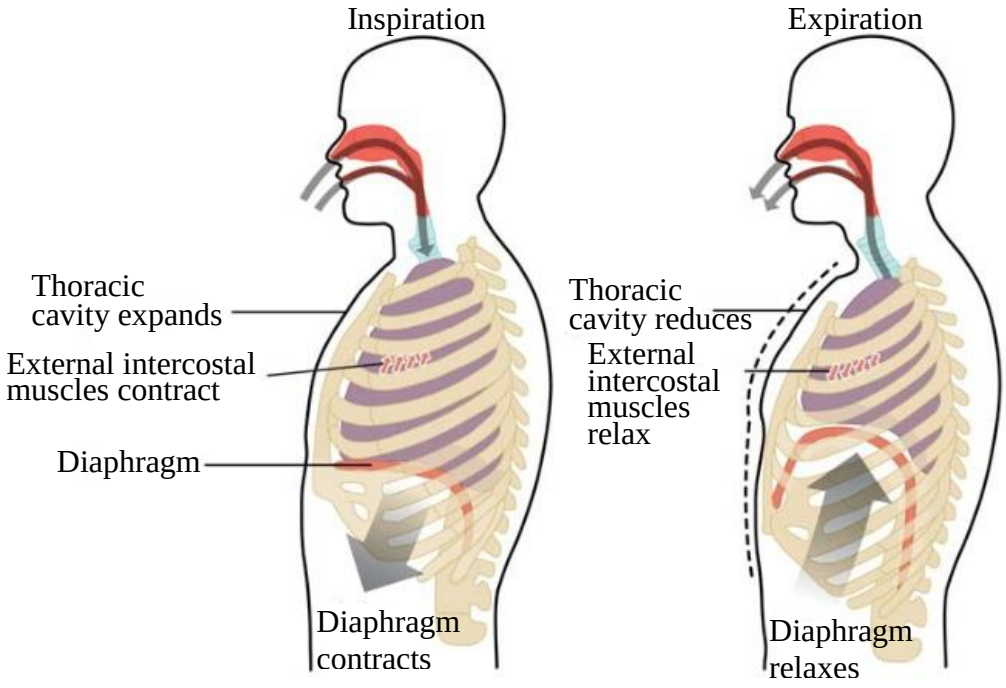


Fig. 63. Process of Breathing [48]

Ex. 18 B. Read the paragraph below about pulmonary ventilation, or natural ventilation of the lungs. Change the capitalized words in brackets for their family words so that they fit the context.

Text C

Pulmonary (VENTILATE) is the process of (BREATHE), which is driven by (PRESS) differences between the lungs and the atmosphere. (PULMONIC) ventilation consists of two processes: (INSPIRE), where air enters the lungs, and (EXPIRE), where air leaves the lungs. A (RESPIRATION) cycle is one (SUBSEQUENTLY) of inspiration and expiration. While (INHALATION), the diaphragm and external intercostal (MUSCULAR) contract, causing the rib cage to (EXPANSION) and move outward, and expanding the (THORAX) cavity and lung volume. This (CREATIVE) a lower pressure within the lung than that of the atmosphere, (CAUSE) air to be drawn into the lungs and the lungs to (INFLATION). While (EXHALATION), the diaphragm and intercostals relax. This makes the thorax recoil and the lungs (DEFLATION). The air pressure within the lungs increases to above the pressure of the atmosphere, (CAUSE) air to be forced out of the lungs. However, during forced (EXHALE), the internal (INTER+COSTAL+MUSCLES = 1 word) and (ABDOMEN) muscles may be involved in (FORCE) air out of the lungs.

Grammar Focus

Ex. 19 A. Work in pairs or small groups. Read together the information below and do the tasks.

1. Compare two sentences:

Pediatricians know ***that neonatal cyanosis suggests lung ventilation problems.***

Педиатры знают, что цианоз у новорожденных свидетельствует о проблемах с вентиляцией легких.

Pediatricians know ***neonatal cyanosis to suggest lung ventilation problems.***

2. Try to translate the second sentence. Is the translation different from the first sentence? If you have problems with translation you may use an online translator.

3. What is the logical relation between the verb 'know' and the part in ***bold italics*** in the first and second sentence?

What name would you choose for the construction in the second sentence?

a) Complex Subject (сложное подлежащее).
b) Complex Object (сложное дополнение).
c) Complex Attribute (сложное определение).

4. What form of the infinitive is used in the example sentence? See Lesson 2 of this Unit to recall the forms of infinitive.

5. What form of the personal pronoun (*личное местоимение*) is used in the example below? What is the initial form? Recall the same forms of the pronouns ***I, you, she, it, we, they***.

I know ***him*** to be a good pediatrician.

6. Learn some other verbs that can be followed by the Complex Object: to expect (*ожидать*), to think (*думать*), to believe (*полагать*, *считать*), to suppose (*полагать*), to consider (*считать*), to find (*находить, признавать*), to order, to command (*приказывать*), to ask (*просить*), to allow (*разрешать*).

7. Here is another group of verbs followed by the Complex Object: to want (*хотеть*), to wish, to desire (*желать*), would like (*хотел(а) бы*). Think what conjunction (*союз*) should be used to translate a sentence with such a verb.

E.g.: The doctor ***would like*** the child to be discharged later.

8. There is still another group of verbs followed by the Complex Object with very distinct features. They are: to see (*видеть*), to hear (*слышать*), to notice (*замечать*), to feel (*чувствовать*), watch, to observe (*наблюдать*), etc. Look at the example sentences and say what differs them from the example in point 1.

The doctor noticed ***the lung edema subside***.

Врач заметил, что отек легких спадает.

The doctor saw ***the lung edema subsiding.***

Врач видел, как спадает отек легких.

9. Study the examples below. What distinct features do they have? Do you understand what ***'s*** stands for in the second sentence (see point 6)?

The nurse made ***the patient take a deep breath.***

Медсестра заставила пациента сделать глубокий вдох.

Let***'s study the normal physiology of human respiration.***
Давайте изучим нормальную физиологию дыхания человека.

Ex. 19 B. Look through the text in **Exercise 18 B** again. Find the examples with the Complex Object in it. Translate these sentences.

Text Translation

Ex. 20 A. Read the text. Think over the translation of the ***words in bold italics***. **Do not use a dictionary, or a translation application!!!** Work in small groups of 3–4 students. Take turns to translate the text.

Text D

Acute Respiratory Failure

Acute respiratory failure (ARF) is a sudden failure of the respiratory system to ensure adequate gas exchanges. Numerous clinical conditions may cause ARF, including pneumonia, obstructive lung diseases (e.g., asthma), neuromuscular diseases (e.g., spinal muscular atrophy and muscular dystrophy). Children, especially infants, are more likely ***to develop*** ARF than adults due to anatomical and physiological features of the respiratory system. Assessing respiratory impairment in the pediatric population is particularly challenging as children frequently present difficulties in reporting symptoms.

Clinicians find pediatric ARF to be a critical medical condition characterized by the sudden and severe inability of the respiratory system to maintain adequate oxygenation and carbon dioxide elimination. Observing an irregular respiratory pattern during the initial days of life is rather common in healthy infants, due to a diminished response to hypoxia and hypercapnia. Nasal respiration performs fundamental functions of warming inspired air, filtering particulates and pathogens through ***mucosal*** and ***ciliary*** mechanisms, and providing an immunological barrier. However, it is important to consider that the diameter of the nostrils and airways is generally reduced in children. Since airway resistance is inversely proportional to the airway radius, nasal obstruction and secretion may be relevant factors in the development of acute respiratory insufficiency. Additionally, the weak neonatal musculature of the pharynx, larynx, and trachea exhibits greater ***collapsibility***, making it more likely for airway obstruction to occur. Therefore, premature infants are more prone to respiratory distress from mild causes since their respiratory mechanisms are even more underdeveloped than in mature infants.

Ex. 20 B. Do the tasks and add information to your **Translation Tips**:

1. Pay attention to the translation of the acronym ARF.
2. Analyze the formation of the words *'mucosal', 'ciliary', 'collapsibility'*. Write down the word formation pairs and their translation.
3. Find all cases of Complex Object in the text. Make sure you've translated them correctly.

4. Find all the Gerunds in the text. Check if it is possible to translate each of them using a Russian noun derived from the verb.

5. Mind the correct translation of the verb *'to develop'* in connection with the subject *'children'*.

6. Make a list of words that were most difficult to translate. Remember them.

STUDENT INDEPENDENT WORK

Ex. 21. Get ready to speak about the structure and functions of the human respiratory system. Make 12–15 sentences. Follow the plan:

1. The main role of the human respiratory system (1 sentence).
2. The pathway of the air (1 sentence).
3. The structure and role of the trachea (2–3 sentences).
4. The parts of the bronchial tree and their roles (3–4 sentences).
5. The structure and role of the lungs (3–4 sentences).
6. The process of breathing (2 sentences).

Ex. 22. Study the interactive 3-D Model from the Introduction of Unit 5 "Human Digestive System" according to the following steps:

1) click on the organ, listen and repeat its pronunciation;
2) think of the Russian translation;
3) make a sentence describing its position in the body against other organs.

As a next step, review the table on the functions of the digestive organs using the QR-link below (Fig. 64).

Fig. 64. Table of Functions of Digestive Organs QR

UNIT 5. HUMAN DIGESTIVE SYSTEM

INTRODUCTION

The human digestive system comprises multiple inner organs, each of which is specifically instrumental to supply the necessary nutrients that will keep us going, or sustain our lives.

Introductory Task

Study the organs of the digestive system using the interactive 3-D model available through the QR-link below (Fig. 65). Practise saying the English terms naming the organs. Provide the Russian equivalents for them.

Fig. 65. Digestive System 3-D Model QR [49]

Essential Vocabulary

Nouns: the mouth, gland, the tongue, the soft palate, the hard palate, the pharynx, the esophagus, the stomach, chyme, gut, the small intestine, the duodenum, the jejunum, the ileum, the large intestine, the caecum, the appendix, the colon, the rectum, the anus, the liver, the gallbladder, the pancreas, the common bile duct, bile, enzymes, stomach juices, the peritoneum, the spleen, digestion, ingestion, propulsion, chewing (mastication), absorption, defecation, peristalsis, segmentation, expulsion, epigastrium, lumen, nutrients, lipids, carbohydrates, proteins, canal, tract.

Verbs: to break down, to propel, to swallow, to ingest, to digest, to chew (to masticate), to churn, to absorb, to store, to emulsify, to lubricate, to release, to eliminate, to disintegrate.

Adjectives (Participles): alimentary, oral, salivary, parotid, sublingual, submandibular, palatal, pharyngeal, esophageal, gastric, duodenal, intestinal, ileac, ascending, transverse, descending, rectal, anal, hepatic, pancreatic, biliary, peritoneal, digestive, absorbable, peristaltic, intestinal, gastrointestinal.

Adverbs: further, subsequently, eventually.

Essential Grammar

Absolute Participial Construction, Attributive Phrases.

LESSON 1. STRUCTURE AND FUNCTIONS OF DIGESTIVE SYSTEM

Sound Focus

Ex. 1 A. Study and revise the pronunciation.

o [ʌ]: st**o**mach, t**o**ngue, **o**ther, ab**o**ve, acc**o**mpany, am**o**ng, n**o**ne, th**o**rough;
! **[aʊ]:** m**ou**th, b**ow**el;
! **o [o]:** c**o**mmon, es**o**phagus, s**o**ft, h**o**llow, par**o**tid;
! c**o**lon [ˈk**oʊ**lon];
all [ɔ:]: all, g**all**bladder, f**all**, sm**all,** sw**all**ow, w**all**;
a [æ]: gl**a**nd, p**a**late, p**a**latal, ph**a**rynx, p**a**ncreas, bl**a**dder, hep**a**tic, g**a**stric, epig**a**strium, s**a**livary, perist**a**lsis, m**a**stication, **a**limentary can**a**l, ch**a**nnel, tr**a**ct, m**a**ndible, m**a**xilla;
a [eɪ]: **a**nus, **a**che, n**a**sal, lubric**a**te, mastic**a**te, elimin**a**te, defec**a**tion, disintegr**a**te, segment**a**tion;
i, y [aɪ]: ch**y**me, b**i**le, enz**y**mes, carboh**y**drates, emulsif**y**, d**i**gest, vill**i**, m**i**crovill**i**;
i, y [ɪ]: ileum, l**i**pids, phar**y**nx, b**i**liary, v**i**lli;
u [ʌ]: prop**u**lsion, exp**u**lsion, em**u**lsify, d**u**ct, g**u**t;
! **u [u]:** n**u**trients, l**u**men, l**u**bricate, jej**u**num.

Ex. 1 B. Read the phrases paying attention to the word stress.

Di**ge**stive **sys**tem; trans**verse** **co**lon; a**scen**ding **co**lon; de**scen**ding **co**lon; **pro**teins, **li**pids and carbo**hy**drates; the small in**te**stine; the **larg**e in**te**stine; duo**de**num, je**ju**num and **i**leum; the ali**men**tary ca**nal**; **sto**mach juices and **en**zymes; the gastroin**tes**tinal tract (GIT); **chew**ing or masti**ca**tion; emulsifi**ca**tion of **fats**; pancre**a**tic and **bi**liary se**cre**tions; the perito**ne**al **ca**vity; esopha**ge**al **walls**; ac**ces**sory di**ges**tive **or**gan.

Before you read

Ex. 2. Work in small groups of 3–4 students. Discuss the following issues and fulfill the tasks.

1. Look at the diagram below (Fig. 66). Discuss what happens to a piece of apple from the moment it got into your mouth. Use the information from the table on the functions of the digestive organs. Use the prompting words in the diagram. Use the Passive forms when speaking.

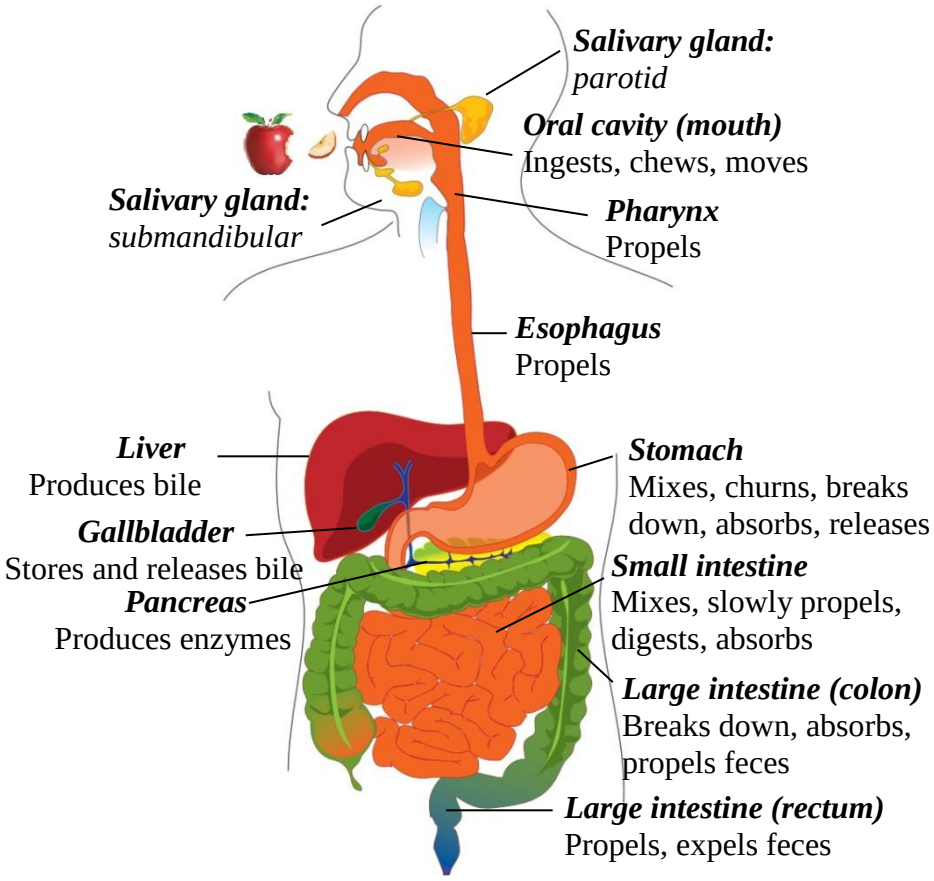


Fig. 66. Human Digestive System [50]

2. Guess the organ by its shape and location.

a) It's a J-shaped organ located below the esophagus and superior to the duodenum;

b) It's a tube-like organ extending between the pharynx and the stomach;

c) It's an elongated organ located behind the stomach;

d) It's a small, pear-shaped organ underneath the liver;

e) It's a tube around 12 fingers long positioned inferiorly to the stomach.

3. Create three similar quiz tasks of your own about other digestive organs.

Enrich your Medical English vocabulary

Ex. 3. Read and translate the words, word combinations and phrases.

Alimentary [ælɪˈmentri]: the alimentary ca***nal***; the alimentary or gastrointestinal tract; the alimentary cycle.

Mastication [ˌmæstɪˈkeɪʃn]: mastication or chewing involves grinding food; ***masticatory*** teeth; to ***masticate***, or to chew food.

Salivary [ˈsælɪvəri]: salivary glands se***crete saliva*** [səˈlaɪvə]; pa***ro***tid, sublingual and submandibular glands are salivary glands.

Ingestion [ɪnˈdʒestʃən]: food ingestion by mouth; ingestion of food; ingestion process; to ***ingest*** and chew the food.

Pharynx [ˈfærɪŋks]: to travel through the pharynx; the ***pharyngeal*** [fəˈrɪndʒiəl] muscles ensure swallowing.

Esophagus [ɪˈsofəgəs]: the pharynx leads to the esophagus; the esophagus propels food to the stomach; the ***esophageal*** [ɪˌsofəˈdʒiəl] sphincter; ***esophageal*** reflux [ˈri:flʌks].

Stomach [ˈstʌmək]: the stomach ***churns*** [tʃɜ:nz] food into ***chyme*** [kaɪm]; the stomach breaks down proteins; stomach, or ***gastric***, juices.

Small intestine [ɪnˈtestɪn]: the small intestine consists of the ***duodenum*** [ˌdu:əˈdi:nəm], ***jejunum*** [dʒɪˈdʒu:nəm] and ***ileum*** [ˈɪliəm]; ***villi*** ['vɪlaɪ] and ***microvilli*** [ˌmaɪkroʊ'vɪlaɪ] of the small intestine.

Digestion [daɪˈdʒestʃən]: mechanical digestion; chemical digestion; for digestion; to make digestion easier; to ***digest*** food; ***digestive*** juices.

Liver: the liver produces ***bile*** [baɪl]; the liver is the largest gland; the liver is an ***accessory digestive organ***.

Gallbladder [ˈgɔ:lˌblædə]: bile is stored in the gallbladder; the gallbladder releases bile through the ***common bile duct*** [dʌkt].

Pancreas [ˈpæŋkriəs]: the pancreas is behind the stomach; enzymes discharged by the pancreas; the pancreatic [pæŋkriˈætik] and biliary [ˈbɪliəri] secretions.

Large intestine: the large intestine comprises four main regions: the ***caecum*** [ˈsi:kəm], the ***colon***, the ***rectum***, and the ***anus***.

Absorption [əbˈzɔ:pʃn]: absorption occurs in the intestine; absorption of fats; to ***absorb*** water and electrolytes [ɪˈlektrəlaɪts].

Expulsion [ɪk'spʌlʃn]: expulsion via the anus; to *ex**pel*** waste products

Time to read

Ex. 4. Read the text silently. Fill in the missing names of the gastrointestinal organs into the text: ***esophagus, stomach, duodenum, liver, ileum, colon, rectum***.

Text A

Human Digestive System

The human digestive system is a complex structure, comprising the primary pathway known as the alimentary canal and the accessory organs that aid in the process of digestion. At the outset of this intricate system is the ***mouth*** with the hard and soft palates forming its roof and separating the oral cavity from the nasal passages, and the teeth and tongue allowing efficient mastication and swallowing. The salivary glands, including the parotid gland, sublingual gland, and submandibular gland, secrete saliva that begins the chemical breakdown of food.

From the mouth, food travels through the ***pharynx*** that leads to the ***(1).*** This tube-like structure uses rhythmic contractions of the smooth muscles to propel food towards the stomach. The ***(2)*** acts as a reservoir where gastric juices further disassemble food particles into a semi-fluid mass known as chyme. Upon leaving the stomach, chyme enters the duodenum, marking the beginning of the small intestine.

The small intestine, a crucial segment of the digestive system, comprises the duodenum, jejunum, and ileum, each playing specific roles in nutrient absorption.

The ***(3)*** contains both the pancreatic and biliary secretions, delivered through the common bile duct, which is critical for the emulsification of fats. The ***(4)*** produces bile stored in the ***gallbladder***, and this bile is released when necessary to aid digestion. The ***pancreas*** discharges digestive enzymes that further disintegrate nutrients.

Below the duodenum, the ***jejunum*** lets nutrient absorption occur, facilitated by its villi and microvilli. Subsequently, the ***(5)*** follows, completing the absorption process and transferring the remaining undigested matter to the large intestine. The large intestine, a wider tube, comprises the caecum, the ascending colon, the transverse colon, the descending colon, and culminates in the rectum and anus.

The entrance of the small intestine's residual contents into the ***caecum*** marks the beginning of the large intestine, where water and electrolytes are absorbed. The ascending ***(6)*** facilitates the upward transit of contents, leading to the transverse ***colon***, which crosses the abdominal cavity. The continuous advancement into the descending ***colon*** aids in further consolidation of waste, eventually reaching the ***(7)***. Here, the final stage of waste formation occurs, preparing it for expulsion via the anus.

The perfect coordination between various organs and structures enables the remarkable efficiency of the human digestive system. The delicate balance between the mechanical and chemical processes occurring within the accessory organs and the alimentary canal ensures the conversion of food into energy, supporting the body's functionality and sustaining life.

Check your understanding

Ex. 5. Read the text again looking for the answers to the questions below. Choose the right answer.

1. What primary function does the mouth serve in the digestive process?

A. Storing food for later consumption.
B. Mechanical breakdown and initial chemical digestion of food.
C. Producing gastric juices.
D. Transferring food to the stomach.

2. What characterizes the movement of food through the esophagus?

A. Random contractions.
B. Stationary positioning.
C. Rhythmic contractions.
D. Spontaneous propulsion.

3. Which organ acts as a reservoir where food is transformed into chyme?

A. The esophagus.
B. The pancreas.
C. The stomach.
D. The duodenum.

4. Which organ releases bile when it's necessary for digestion?

A. The liver.

B. The duodenum.

C. The gallbladder.

D. Either the liver, or the gallbladder.

5. How do the villi and microvilli contribute to the digestive process?

A. They produce digestive enzymes.

B. They facilitate nutrient absorption.

C. They propel food through the intestines.

D. They store waste materials.

6. What characterizes the final stage of the large intestine's function?

A. Producing bile.

B. Breaking down complex nutrients.

C. Consolidating waste and preparing for expulsion.

D. Absorbing water and electrolytes.

7. What is the significance of the pancreatic and biliary secretions?

A. They store food.

B. They help in the mechanical breakdown of food.

C. They aid in the disintegration and emulsification of nutrients.

D. They transfer food between organs.

8. What finally happens to the undigested food in the digestive system?

A. It is completely dissolved.

B. It is transformed into energy.

C. It is expelled via the anus.

D. It remains in the large intestine.

9. Which statement best describes the human digestive system?

A. A simple linear process of food breakdown.

B. A complex system involving mechanical and chemical processes.

C. An isolated function of individual organs.

D. A process that occurs only in the stomach.

Ex. 6. Agree or disagree with the statements. If you disagree, say why.

1. The human digestive system comprises the primary pathway known as the alimentary canal and the accessory organs that aid in the process of digestion.

2. The salivary glands, including the parotid gland, sublingual gland, and submandibular gland, secrete enzymes that begin the chemical breakdown of food.

3. The mouth allows for efficient mastication and swallowing of food, and the pharyngeal smooth muscles enable further propulsion of food into the small intestine.

4. The stomach acts as a reservoir where gastric juices further disassemble food particles into a fatty solid mass known as chyme.

5. The pancreatic and biliary secretions delivered through the common bile duct are critical only for the emulsification of fats.

6. The jejunum, which follows the ileum, is characterized by villi and microvilli, facilitating nutrient absorption.

7. The large intestine absorbs water and electrolytes, facilitates the upward and downward transit of contents, and consolidates waste for expulsion via the anus.

8. The efficiency of the human digestive system is provided by the coordination between the parts of the large intestine.

Develop your vocabulary

Ex. 7 A. Match the words on the left with their synonyms on the right.

1. mastication	a) disintegrate, disassemble
2. break down	b) pushing, propelling
3. conduit	c) eating
4. propulsion	d) chewing
5. ingestion	e) forward movement
6. expulsion	f) remaining
7. residual	g) passage, pathway
8. advancement	h) removal, elimination

Use the synonyms instead of the words ***in bold italics***.

1. Japanese people believe thorough ***chewing*** to promote healthy digestion.
2. The digestion process starts with food ***eating*** and ends with feces ***elimination***.
3. The esophagus forms a straight ***pathway*** for food from the pharynx to the stomach.
4. The ***remaining*** mass is propelled through the colon by ***forward movement*** to the rectum.
5. Upon ***pushing*** the ingested food into the stomach the muscles of the esophagus relax.

Use the QR-link to do it quicker (Fig. 67).

Fig. 67. Digestive System Lesson 1 Exercise 7 A QR

Ex. 7 B. Match the words on the left with their antonyms on the right.

1. ascending	a) relaxation
2. rhythmic	b) specific
3. assemble	c) initially
4. contraction	d) indigestion
5. common	e) arrhythmic
6. eventually	f) descending
7. subsequently	g) disassemble
8. digestion	h) before

Use one or both the opposites from the pair to fit into the sentence. Translate the sentences.

1. The colon is subdivided into three portions, the last one being the … colon.
2. The discomfort in the substernal area was caused by the … contractions of the esophagus.
3. The alimentary canal … extends from the mouth followed by the pharynx, which … leads to the esophagus, stomach and intestines, … terminating at the anus.
4. The child was curiously watching the doctor … the instruments into his briefcase.
5. His ingesting badly washed fruits resulted in severe ….
6. Peristalsis consists of sequential, alternating waves of contraction and … of the smooth muscles of the alimentary canal wall.
7. Each part of the digestive system performs its … job of breaking down food into nutrients, and converting nutrients into energy to pursue a … goal of sustaining our lives.

Use the QR-link to do it quicker (Fig. 68).

Fig. 68. Digestive System Lesson 1 Exercise 7 B QR

Ex. 8. Choose the best translation for the sentence. What's wrong with the other sentence?

1. Оказывается, желудочно-кишечный тракт человека состоит из пищеварительного канала и вспомогательных органов.

a) The human gastrointestinal tract proves to consist of the alimentary canal and accessory organs.

b) The human gastrointestinal tract appears to be composed of the food digestion canal and access organs.

2. Известно, что пищеварительный канал начинается во рту, куда пища поступает и затем проталкивается через глотку благодаря проглатыванию, попадая по пищеводу в желудок.

a) It is known, that the elementary canal begins in the mouth, where food is ingested and then propelling through the pharynx by swelling to get into the stomach along the esophagus.

b) The alimentary canal is known to begin in the mouth, where food is ingested and then propelled through the pharynx by swallowing to get into the stomach along the esophagus.

3. Из желудка частично переваренная пища в виде химуса проходит в двенадцатиперстную кишку, куда по общему желчному протоку одновременно поступает желчь и ферменты, которые способствуют дальнейшему разложению химуса на питательные вещества.

a) From the stomach, partially digested food in the form of chyme passes into the duodenum, where bile and enzymes simultaneously enter through the common bile duct to aid further disassembling of the chyme into nutrients.

b) From the stomach, partially undigested food in the form of chyme passes into the duodenum, where bile and enzymes together enter through the common bile duct to aid further integration of the chyme into nutrients.

4. Ворсинки и микроворсинки в тощей и подвздошной кишке обеспечивают эффективное всасывание жиров, белков и углеводов.

a) Villi and microvilli in the jejunum and ileum ensure effective absorption of fats, proteins and carbohydrates.

b) Villi and microvilli in the jejunum and caecum ensure effective resorption of fats, proteins and carbohydrates.

5. Вспомогательные органы пищеварения, включая печень, желчный пузырь и поджелудочную железу, выделяют желчь и пищеварительные ферменты, которые играют ключевую роль в эмульсификации жиров.

a) Digestive auxiliaries, including the liver, gallbladder, and pancreatic, secrete bile and enzymes that play a key role in fat emulsification.

b) The accessory digestive organs, including the liver, gallbladder, and pancreas, secrete bile and digestive enzymes that play a critical role in fat emulsification.

6. Толстый кишечник продолжает проталкивать остаточное содержимое по восходящей, поперечной и нисходящей кишке до прямой кишки, поглощая воду и электролиты и подготавливая отходы к удалению через анальное отверстие.

a) The large intestine continues to push the residual contents up the ascending, transverse and down the descending colon to the rectum, absorbing water and electrolytes and preparing waste for expulsion through the anus.

b) The large intestines continue to move the residue contents up the ascending, transverse and down the descending colon to the rectum, absorbing water and electrolytes and preparing waste for expel through the anus.

7. Идеальная координация между различными органами и тонкий баланс между механическими и химическими процессами, происходящими во вспомогательных органах и пищеварительном тракте, обеспечивают превращение пищи в энергию, поддерживая функциональность организма.

a) The perfect coordination between various organs and the delicate balance between the mechanical and chemical processes occurring within the accessory organs and the alimentary canal ensures the conversion of food into energy, supporting the body’s functionality.

b) The perfect coordination between varied organs and the delicate balance between the mechanical and chemical processes occurring within the accessory organs and the alimentary canal causes the conversion of food into energy, supporting the body's functionality.

STUDENT INDEPENDENT WORK

Ex. 9. Use the QR-link below (Fig. 69) to read a chapter on the accessory digestive organs (the liver, pancreas and gallbladder). Take notes according to the following plan:

1) Organ name;
2) Organ location;
3) Organ function.

Fig. 69. Accessory Organs in Digestion Chapter QR [51]

Search the Internet to find information about any specific pediatric features of these organs. Get ready to share your findings in class.

LESSON 2. ACCESSORY DIGESTIVE ORGANS

Sound Focus

Ex. 10. Pronounce the word combinations based on the rules you've learned. Translate the phrases.

Human digestive system; the gastrointestinal tract; the alimentary canal and accessory digestive organs; rhythmic contraction of esophageal walls; the salivary glands; lubricated by the saliva; churned by the stomach into chyme; the duodenum, jejunum, and ileum; the lumen of the common bile duct; pancreatic and biliary secretions; absorption of nutrients; facilitated by villi and microvilli; the caecum marks the beginning of the large intestine; the small intestine's residual contents; the ascending, transverse and descending colon; expulsion via the anus; propulsion into the rectum; the remaining undigested matter.

Grammar Focus

Ex. 11 A. Read the description of one of the accessory digestive organs at the next page. Each line contains one unnecessary word, which can be either a preposition, or an article, or the infinitive particle 'to'. Find the unnecessary word,

and write it out in your exercise book against the line number. Say what organ is described. Learn the following words to enrich your Medical English vocabulary:

quadrate lobe [ˈkwodreɪt] – квадратная доля;
caudate lobe [ˈkɔ:deɪt] – хвостатая доля;
peritoneal fold – перитонеальная складка;
to divert [daɪˈvɜ:t] – отводить, отклонять.

Text B

It is the largest gland in the body, weighing only 125 gram at the birth and reaching the mass of 1,400 gram in adults. For being an accessory digestive organ, it also plays a number of roles in metabolism and the regulation. It lies inferior to the diaphragm in the right upper a quadrant of the abdominal cavity. It is divided into with two primary lobes: a large right lobe and a much smaller left lobe. In the right lobe, some anatomists also to identify an inferior quadrate lobe and below a posterior caudate lobe. It is connected up to the abdominal wall and diaphragm by five peritoneal folds referred to as a ligaments. To aid the digestive process it secretes bile, which is transported to the duodenum through out the common bile duct to emulsify fats down for the body to absorb them. Though bile secretion never stops, the valve-like hepatopancreatic ampulla lets it to enter the small intestine only when needed. Between meals, a bile is produced but diverted to the gallbladder for the conservation and concentration.

1
2
3
4
5
6
7
8
9
10
11
12
13
14

To do the exercise quicker and more interactively, use the QR-link below (Fig. 70).

Fig. 70. Digestive System Lesson 2 Ex. 11 A QR

Ex. 11 B. Label the anatomical structure of the liver region in the diagram below (Fig. 71) based on Text B above. Provide some information about the diagram elements.

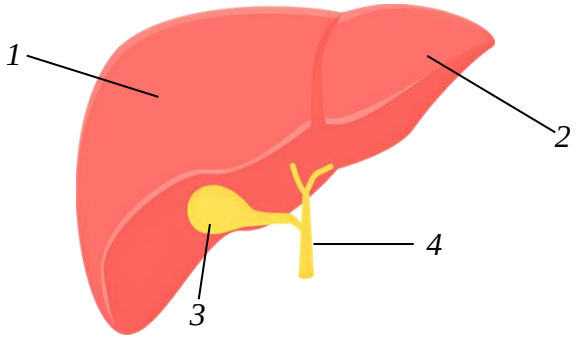


Fig. 71. Liver [51]

Ex. 12. Read the description of the gallbladder. Open the brackets using the verb in the correct Active or Passive form. Label Figure 72. Remember the word ***taper (конус)***.

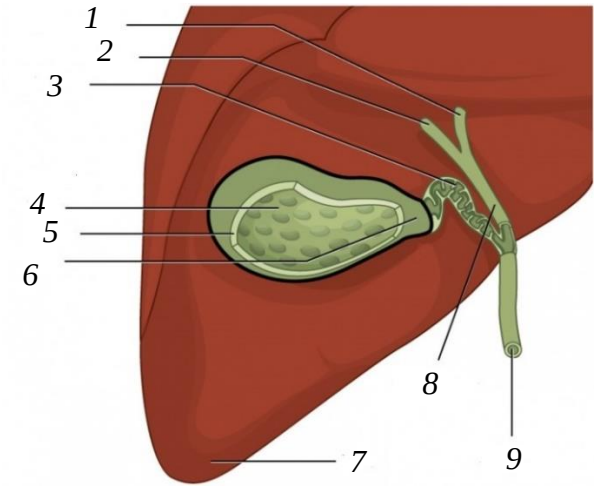


Fig. 72. Gallbladder [51]

Text C

The gallbladder is 8–10 cm long and ***(to nest)*** in a shallow area on the posterior aspect of the right lobe of the liver. This muscular sac ***(to store)***, ***(to concentrate)***, and, when stimulated, ***(to propel)*** the bile into the duodenum via the common bile duct. It ***(to divide)*** into three regions. The fundus is the widest portion and ***(to taper)*** medially into the body, which in turn ***(to narrow)*** to become the neck. The neck ***(to angle)*** slightly superiorly as it ***(to approach)*** the hepatic duct. The cystic duct is 1–2 cm long and ***(to turn)*** inferiorly as it ***(to bridge)*** the neck and hepatic duct. The simple columnar epithelium of the gallbladder mucosa ***(to organize)*** in rugae, similar to those of the stomach. There is no submucosa in the gallbladder wall. The wall's middle muscular coat ***(to make)*** of smooth muscle fibers. When these fibers ***(to contract)***, the gallbladder's contents ***(to eject)*** through the cystic duct and into the common bile duct. Visceral peritoneum ***(to hold)*** the gallbladder against the liver and ***(to form)*** the outer coat of the gallbladder. The gallbladder's mucosa ***(to absorb)*** water and ions from bile, concentrating it by up to 10-fold.

To do the exercise quicker and more interactively, use the QR-link below (Fig. 73).

Fig. 73. Digestive System Lesson 2 Ex. 12 QR

Explain the word formation pattern of the verbs: ***to nest, to taper, to narrow, to angle, to bridge, to form***.

Ex. 13. Read the information about the use of attributive phrases in English medical contexts.

The English language, and particularly Medical English, tends to utilize attributive phrases, i.e. phrases composed of an adjective, participle, or attributive noun in pre-position and the other noun to be defined. For example, *"decreased appetite"* rather than *"a decrease in appetite"*, or *"esophageal obstruction"* rather than *"obstruction of the esophagus"*, or *"stomach walls"* rather than *"the walls of the stomach"*. However, in Russian the tendency is quite the opposite, i.e. we will more often see *«снижение аппетита»*, *«обструкция пищевода»*, *«стенки желудка»* in medical contexts. ***Good advice: To make the English abstracts of your future medical articles sound more natural in English, follow the rule of Attributive Phrase Preference!***

Ex. 14 A. Read the passage about the pancreas below. Change the ***emphasized phrases*** for attributive phrases of the same meaning. Label Figure 74.

Learn new words and enrich your Medical English vocabulary:
retroperitoneum [retrəʊperɪtəˈniːəm] – забрюшинное пространство;
hilum of the spleen [ˈhaɪləm] – ворот селезенки;

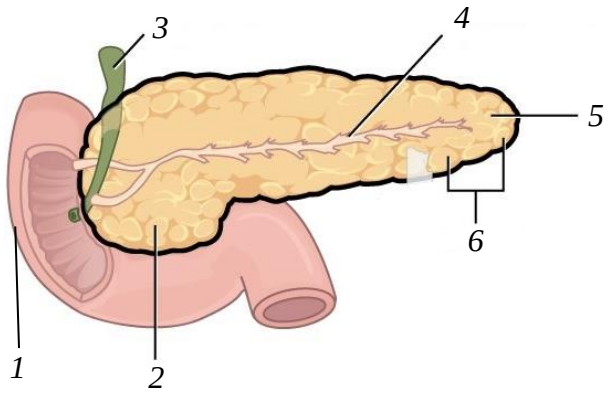


Fig. 74. Pancreas [51]

Text D

The soft, oblong, ***pancreas made of lobules*** lies transversely in the retroperitoneum behind the stomach. Its head is nestled into the ***curvature of the duodenum in the shape of C***, with the body extending to the left about 15.2 cm and ending as a ***tail, which tapers*** in the hilum of the spleen. The pancreas produces over a liter of ***juice of the pancreas*** each day. Unlike bile, it is clear and composed mostly of water along with some salts, sodium bicarbonate, and several ***enzymes for digestion***. ***Enzymes of the pancreas*** are active in the digestion of sugars, proteins, and fats. The pancreas produces ***enzymes digesting proteins*** in their inactive forms. These enzymes are activated in the duodenum. If produced in an active form, they would digest the pancreas (which is exactly what occurs in the disease, pancreatitis). ***The pancreatic juice rich in enzymes and bicarbonates*** is delivered to the small intestine through ***ducts of the pancreas***, the larger of which fuses with the common

bile duct. ***Juice of the pancreas*** buffers the ***juice from the stomach high in acids***, inactivates ***pepsin from the stomach***, and enables the optimal functioning of ***enzymes for digestion*** in the small intestine.

Ex. 14 B. Work in pairs. Restore the questions in the conversation between Dr. Taylor and Jamie. Fill in the necessary phrases into Jamie's answers based on the text above. Act their conversation and try to add a question and an answer that have not been discussed in the conversation.

To do the exercise quicker and more interactively, use the QR-link below (Fig. 75).

Fig. 75. Digestive System Lesson 2 Ex. 14 B QR

Dr. Taylor: All right, Jamie. Let's break it down. (1) is the pancreas located?

Jamie: Yes, I do remember. It's that organ behind the stomach, (2)?

Dr. Taylor: Exactly. The soft, oblong pancreas lies transversely behind the stomach. And where exactly (3)?

Jamie: Well, its head is nestled in the (4) of the duodenum, the body extends to the left about 15 cm ending as a (5) in the hilum of the spleen.

Dr. Taylor: Right. (6) food?

Jamie: Actually, the pancreas being an accessory organ doesn't digest food, but it produces over a liter of (7) each day to aid digestion.

Dr. Taylor: Spot on! And what (8)?

Jamie: It is composed mostly of water along with some salts, sodium bicarbonate, and several (9), so it is clear unlike bile.

Dr. Taylor: You know a lot. I suppose my next question will be easy for you. How and where (10) by the pancreas?

Jamie: Yeah. The pancreas delivers its juice to the duodenum through (11) fusing with (12). Pancreatic secretion is regulated by hormones and the parasympathetic nervous system.

Dr. Taylor: Perfect. And the last question. How (13)?

Jamie: Pancreatic juice buffers (14), inactivates (15), and enables the optimal functioning of (16) in the small intestine.

Dr. Taylor: Precisely. It's good you are so well informed.

Jamie: Agreed. Knowledge is power!

Ex. 15. Translate parts of the sentences about congenital gastrointestinal anomalies. Make use of the rule of Attributive Phrase Preference.

Learn new words and enrich your Medical English vocabulary:

obstruction [əbˈstrʌkʃən] – непроходимость, закупорка;

hernia [ˈhɜːniə] – грыжа; to herniate – образовывать грыжу;

malformation [ˌmælfəˈmeɪʃən] – порок развития;

viscera [ˈvɪsərə] – внутренние органы.

1. (*Непроходимость пищевода, желудка, двенадцатиперстной кишки и тощей кишки*) should be considered when excess amniotic fluid (polyhydramnios) is seen on a prenatal ultrasound.

2. In omphalocele, (*грыжа* ***внутренних органов***) are covered by a thin membrane and may be small (only a few loops of intestine) or may contain most of (*внутренние органы брюшной полости*) (intestine, stomach, liver).

3. A common type of anomaly is atresia, including (*атрезия пищевода*), followed by atresia in the (*область тощей и подвздошной кишки*) and in the duodenum.

4. Some (*врожденные пороки развития ЖКТ*), such as malrotation, have a very good outcome, whereas others, such as (*врожденная грыжа диафрагмы*), have a poor outcome.

STUDENT INDEPENDENT WORK

Ex. 16. Review the information on the digestive processes using the QR-link from Unit 4, Lesson 3, Exercise 22 (Fig. 64, p. 82). Take notes according to the following the plan:

1) ***What***: digestive process;

2) ***How***: acts included;

3) ***Where***: organs involved.

Think what processes are problematic or even impossible in infants due to their immature digestive system.

Study the Overview of Congenital Gastrointestinal Anomalies using the QR-link below. Think what digestive processes can be compromised by these anomalies.

Fig. 76. Overview of Congenital Gastrointestinal Anomalies QR [52]

Get ready to share your ideas in class.

LESSON 3. DIGESTIVE PROCESSES

Word Formation

Ex. 17 A. Review Table 14 below.

Table 14

Greek and Latin Parts of Anatomical Digestive System Terms

Word part	Definition	Examples with meaning
Hepat(o)	Associated with the liver	Hepatosis – non-inflammatory functional disorder of the liver
Bili	Associated with bile	Biliary dyskinesia – a disorder in which bile cannot move in the necessary direction
Chol(e/o) [koli]	Associated with bile	Cholestasis – slowing or stoppage of bile flow
Cholecyst(o) [kolisist]	Associated with the gallbladder	Cholecystitis – inflammation of the gallbladder
Choledoch(o) [kolidok]	Associated with the common bile duct	Choledochotomy – surgery on the common bile duct
Cholangi(o) [koˈlændʒio]	Associated with bile ducts	Cholangioscopy – visualization of a bile duct using the endoscope
Pancreat(o) [pæŋkriəˈt]	Associated with the pancreas	Pancreatitis – inflammation of the pancreas
Gastr(o) [gæstrə]	Associated with the stomach	Gastritis – inflammation of the stomach mucosa
Sial(o) [si(æ)lə]	Associated with salivary glands, or saliva	Sialadenitis – inflammation of a salivary gland
Gloss(o)	Associated with the tongue	Glossitis – inflammation of the tongue
Enter(o)	Associated with the small intestine	Enteritis – inflammation in the small intestine
Col(o)/Colon(o)	Associated with the large intestine, or colon	Colonoscopy – an examination of the inside of your large intestine

Ex. 17 B. Read the medical terms below and try to explain them. Give their equivalents in Russian.

Hepatic fibrosis; gastroduodenoscopy; infantile colic; gastroesophageal reflux; ascending cholangitis; pediatric gastroenteritis; hepatomegaly; chronic sialorrhea; extrahepatic biliary atresia (*tresia – opening, passage*); cholecystectomy; ankyloglossia (*ankylo – immobile, fused*); choledochal cyst.

Ex. 18 A. Match the adjectives to the parts of the gastrointestinal tract. Be careful, all the adjectives come from Greek and Latin, while some of the names of organs remain English by origin.

Organs: mouth, gland, tongue, throat, esophagus, stomach, duodenum, jejunum, ileum, small intestine, large intestine (colon), cecum, rectum, anus, outside the liver, inside the liver, gallbladder, common bile duct, pancreas, spleen, kidney, salivary gland.

Adjectives: esophageal, pancreatic, anal, ileac (ileal), gastric, pharyngeal, oral, rectal, cholecystic, jejunal, extrahepatic, enteric (enteral), glandular, sialic, choledochal, colonic, intrahepatic, glossal, duodenal, renal, cecal, splenic.

Ex. 18 B. Use some of the adjectives to fill in the gaps in the sentences and translate the sentences. Learn the following:

Intestine = bowel = gut.

1. Sclerosing cholangitis is a chronic, progressive disease of the biliary tract characterized by inflammation and fibrosis of the (INSIDE THE LIVER) and (OUSIDE THE LIVER) bile ducts.
2. (SMALL INTESTINE) feeding is preferable as it promotes gut adaptation and maximizes absorption.
3. A (COMMON BILE DUCT) cyst is a congenital anomaly of the duct (tube) that transports bile from the liver to the gallbladder and small intestine.
4. Symptoms of impaired (COLON) motility include abdominal pain and constipation.
5. (TONGUE) problems may complicate a child's ability to chew or swallow effectively.
6. Prognosis is based on the length of remaining small bowel and the presence of the (ILEUM + CECUM) valve.
7. Pancreas is a (GLAND) organ located in the (DUODENUM) curvature by its head.

To do the exercise quicker and more interactively, use the QR-link (Fig. 77).

Fig. 77. Digestive System Lesson 3 Exercise 18B QR

Grammar Focus

Ex. 19. Review the following information on the ***Absolute Participial Construction*** (независимый причастный оборот) in English.

1. Look at the sentence below.

As the infant has no teeth in its mouth, the process of mastication is fully replaced by sucking process.

Поскольку у младенца во рту нет зубов, процесс жевания полностью заменяется процессом сосания.

2. The example sentence is complex presenting cause-and-effect relations between clauses (parts). However in English, unlike Russian, you may express the same idea using a simple sentence and saving the cause-and-effect relations.

The infant having no teeth in its mouth, *the process of mastication is fully replaced by sucking process.*

As you see, Present Participle Simple *(-ing* form) is used for this purpose. The doer of the action (***'the infant'*** in the example) remains in its place before the Present Participle. The translation is the same.

3. Translate the sentences below.

The digestive system reaching its maturity by ages 5–7*, children may experience various gastrointestinal problems in their early life.*

One third of infants with a GI malformation possibly having another congenital anomaly*, they should be evaluated for malformations of other organ systems, especially of the central nervous system, heart, and kidneys.*

Copper being found in excess on liver biopsies*, clinicians has proposed it to be a potential hepatic toxin leading to the development of primary sclerosing cholangitis in neonates.*

4. Review another pair of example sentences.

After the bile and pancreatic juice have broken down food into the smallest, most basic units, it is absorbed by the jejunal villi.

The bile and pancreatic juice having broken down food into the smallest, most basic units, *it is absorbed by the jejunal villi.*

После того, как желчь и сок поджелудочной железы расщепляют пищу на мельчайшие, самые простые частицы, она поглощается ворсинками тощей кишки.

In the example above you see the Present Participle Perfect ***'having broken'*** used to show the time relations between the clauses. Yet in Russian only a complex sentence is possible in this case.

5. Translate the following sentences.

The esophagus having propelled the ingested food down*, the gastroesophageal sphincter opens to let it pass into the stomach.*

The fatty chyme having been pushed into the duodenum*, the gallbladder is stimulated to release bile through the common bile duct.*

6. In the example sentences above you can see the Absolute Participial Construction as the first clause before the main clause. In these cases it can show either cause-and-effect relations (if it is Simple), or time relations (if it is Perfect). But things are a little bit different if this construction appears at the end of the sentence as the second clause after the first and main one. Review the following examples.

Ingestion of food is usually followed by ***mastication, it representing the first stage of mechanical digestion.***

Прием пищи обычно сопровождается ***жеванием, которое представляет собой первый этап механического пищеварения.***

Digestive secretions break down complex food molecules into their chemical building blocks, ***proteins being disintegrated into separate amino acids.***

Пищеварительные секреты расщепляют сложные молекулы пищи на химические составляющие, ***при этом белки распадаются на отдельные аминокислоты.***

7. Translate the following sentences.

Absorption takes place in the jejunoileal region of the small intestine, ***villi and microvilli being the key instruments in this process.***

Lipids are absorbed into lacteals (млечные сосуды), ***the latter transporting them via the lymphatic vessels to the bloodstream*** *(the subclavian veins near the heart).*

Text Translation

Ex. 20 A. Read the text. Think over the translation of the ***words in bold italics***. **Do not use a dictionary, or a translation application!!!** Work in small groups of 3–4 students. Take turns to translate the text.

Text E

Congenital Gastrointestinal Anomalies in Infants

Most congenital gastrointestinal (GI) anomalies present as intestinal obstruction, frequently manifesting as feeding difficulties, distention, emesis, and an inability to pass gas and stool at birth or within 1 or 2 days of age. Some congenital GI ***malformations***, such as ***malrotation***, have a very good outcome, whereas others, such as congenital diaphragmatic hernia, have a poor outcome (including having a mortality rate of 10 to 30 % or even higher depending on the study).

A common type of anomaly is atresia, in which a segment of the digestive tract ***fails to form or develop normally***, or the organ having formed, an intrauterine event, such as a vascular disruption, destroys it. The most common type has proved to be esophageal atresia, followed by atresia in the jejunoileal region and in the duodenum.

Immediate management includes bowel decompression (by continuous nasogastric suction to prevent emesis, it leading to aspiration pneumonia or further abdominal distention with respiratory complications). Pediatric surgeons aiming at the infant's optimal condition for surgery, maintenance of body temperature, prevention of hypoglycemia and dehydration with ***I.V.*** fluids containing 10 % dextrose and electrolytes, and prevention or treatment of acidosis and infections are also vital.

Since approximately one third of infants with a GI malformation may have another congenital anomaly (e.g., up to 50 % in those with congenital diaphragmatic hernia and up to 70 % in those with omphalocele), they should be evaluated for malformations of other organ systems, especially of the central nervous system, heart, and kidneys.

Ex. 20 B. Do the tasks and add information to your **Translation Tips**:

1. Guess the meaning of the prefix ***mal*** in the compound words denoting GI conditions.

2. Note down the translation of the phrase ***'fails to form'*** and make a conclusion on the translation of such phrases.

3. What does ***I.V.*** stand for?

4. Note down the translation of the word ***'since'***. What other meanings of this word do you know?

5. Find all the attributes (adjectives, participles, or nouns) associated with gastrointestinal organs and check their translation into Russian. Note down the phrases that seem difficult.

6. Find all *–ing*-forms (present participles or gerunds) in the text and check their translation into Russian.

7. Find one case of the Complex Subject and check if you have translated it correctly.

8. Find three cases of the Absolute Participial Construction and check if you have translated them correctly.

9. Make a list of words that were most difficult to translate. Remember them.

STUDENT INDEPENDENT WORK

Ex. 21. Get ready to speak about the structure and functions of the human digestive system. Make 12–18 sentences. Follow the plan:

1. The two subdivisions of the human digestive system (1 sentence).
2. The pathway of food through the alimentary canal (1–2 sentences).
3. The position, form and function of the stomach (2–3 sentences).
4. The position, parts and function of the small intestine (2–3 sentences).
5. The position, parts and function of the large intestine (2–3 sentences).
6. The accessory organs (the liver, the gallbladder, the pancreas), their position and forms, their functions (5–6 sentences).

Ex. 22. Get ready for your ***graded credit class*** at the end of the term.

1. Prepare your speech on the topic "Speak about ***one*** of the human anatomical systems and its functions (the skeletal, muscular, cardiovascular, respiratory, or digestive system)". For this purpose, write a passage of 12–15 sentences describing ***one*** of the systems up to your choice. Use the plans from the Student Independent Work parts at the end of each Unit (pp. 25, 46, 64, 82, 102). Use the ***Self-Evaluation Tasks*** at the next page for lexical help.

2. Prepare for ***Translation Skills Control***. For this purpose, review the ***Translation Tips*** you have made when you practised translating the texts. Evaluate your translation skills trying to translate the texts given in ***Self-Evaluation Tasks*** at the next page.

SELF-EVALUATION TASKS

Unit 1. Human Skeletal System

1. ***Describe the following parts of the human skeletal system using the active vocabulary.*** Use the figures in Unit 1.

The skull: the axial skeleton, the bony structure of the head, the cranial and facial parts, to be composed of single and paired bones, to be connected by sutures, to fuse while the child is growing. Describe the location of a skull bone (e.g. the frontal bone, the occipital bone, the mandible, etc.)

The vertebral column: the axial skeleton; the spinal column, or the spine, or the backbone; to be divided into 5 regions; to consist of vertebrae; the cervical spine (C1–C7, the atlas, the axis); the thoracic spine (T1–T12); the lumbar spine (L1–L5); the sacral spine (5 fused vertebrae); the coccyx.

The thorax: the axial skeleton; to be formed by the sternum (or breastbone) and 12 pairs of ribs; to consist of the manubrium, body and xiphoid process; true ribs; false ribs; floating ribs; to protect vital internal organs.

The pectoral (shoulder) girdle: the appendicular skeleton; the upper extremity (limb); to be attached to the axial skeleton by; the upper arm, forearm and hand; the humerus, ulna and radius; to articulate to form the elbow joint; carpal bones and metacarpals; to meet at the wrist; fingers; 14 phalanges.

The pelvic girdle: the appendicular skeleton; the lower extremity (limb); to be attached to the axial skeleton by; the thigh, lower leg (shin) and foot; the femur, tibia and fibula; to articulate to form the knee joint; to meet at the ankle; tarsal bones and metatarsals; toes; 14 phalanges.

2. ***Practise translating the following text:***

Developmental dysplasia of the hip seems to result from laxity of the ligaments around the joint or from in utero positioning. Asymmetric skin folds in the thigh and groin (пах) are common, but such folds also occur in infants without developmental dysplasia of the hip. If the dysplasia remains undetected and untreated, the affected leg eventually becomes shorter, and the hip is likely to become painful. Abduction of the hip is often impaired due to adductor spasm.

Unit 2. Human Muscular System

1. ***Describe the human muscular system using the active vocabulary.*** Use the figures in Unit 2. Make 5–7 sentences.

Main muscle types: the smooth muscles; the skeletal muscles; the cardiac muscle; to contract voluntarily/involuntarily; to have striations; to have long cylindrical/branched/fusiform fibers; to be located in the inner organs; to facilitate movements; to support posture; to act as flexors and extensors; biceps and triceps; to be under conscious control.

Muscle shapes: according to the direction of fibers; the pattern of muscle fibers; transverse and oblique muscles; parallel muscles; fusiform muscles; pennate muscles;

convergent muscles; circular muscles; to run round; to be spindle-like; the point of origin/insertion; to have a diagonal pattern of fibers.

2. ***Practise translating the following text:***

Spinal muscular atrophy (SMA) represents a group of genetic (inherited) neuromuscular disorders causing certain skeletal muscles to become weak and waste away (atrophy). SMA involves the loss of a specific type of nerve cell in your spinal cord called lower motor neurons, or anterior horn (por) cells tailored to control muscle movement. Without these motor neurons, muscles don't receive the nerve signals that make them move. The weakness in SMA tends to be more severe in the muscles that are close to the center of your body (proximal muscles) than in the muscles farther away from your body's center (distal muscles), muscle weakness worsening with time.

Unit 3. Human Cardiovascular System

1. ***Describe the human cardiovascular system using the active vocabulary.*** Use the figures in Unit 3.

The structure of the human heart: to pump blood; to be positioned within the thoracic cavity; to rest against the third rib; to be composed of four chambers; the upper chambers, or atria; the lower chambers, or ventricles; to be thicker than the walls of the right ventricle; the atrioventricular valves; the mitral valve; the tricuspid valve; the semilunar valves; the pulmonic valve; the aortic valve; to regulate the blood flow; to contract simultaneously; to be separated by the septum.

Blood circulation: systemic circulation; pulmonary circulation; the ascending/descending aorta; blood vessels; arteries carrying oxygenated blood; deoxygenated blood returned by veins; the superior vena cava; the inferior vena cava; to branch into capillaries; gas exchange; carbon dioxide; to be expelled upon exhalation; to be equipped with valves to prevent backflow.

2. ***Practise translating the following text:***

Patent foramen ovale (PFO) is included into a group of conditions known as atrial septal defects, though being a remnant of normal fetal anatomy. Presenting no major clinical effects in neonates, it may persist into adulthood. Most adult patients with a PFO are expected to be asymptomatic; however, in some adults, PFO may result in an inter-atrial, right-to-left shunting of deoxygenated blood and the potential for shunting venous thromboembolism to the arterial circulation.

Unit 4. Human Respiratory System

1. ***Describe the human respiratory system using the active vocabulary.*** Use the figures in Unit 4.

The structure of the respiratory system: the conducting zone; the respiratory zone; to travel through the airways; to pass through the pharynx and larynx; into the trachea; to extend from the larynx; to be formed by C-shaped cartilages; to prevent from collapsing; to branch into primary bronchi; the bronchial tree; to further branch into bronchioles; to end in the alveoli; the major organs of the respiratory system; cilia lining the airways.

The lungs: the major organs of the respiratory system; the right lung; the left lung; to be wider and shorter than; to occupy a smaller volume; to be enclosed by the pleura; to be attached to the mediastinum; the cardiac notch; to be composed of lobes; during inhalation/exhalation; the diaphragm and the intercostal muscles; to contract/to relax; to inflate/to deflate.

2. ***Practise translating the following text:***

Nasal respiration performs fundamental functions of warming and moistening the inspired air, filtering particulates and pathogens through mucosal and ciliary mechanisms. However, it is important to consider that the diameter of the nostrils and airways is generally reduced in children. Airway resistance being inversely proportional to the airway radius, nasal obstruction and secretion may be relevant factors in the development of acute respiratory insufficiency.

Unit 5. Human Digestive System

1. ***Describe the human digestive system using the active vocabulary.*** Use the figures in Unit 5.

The alimentary canal: to start with the oral cavity (mouth); to ingest food; to allow efficient mastication and swallowing; to propel through the pharynx and esophagus; towards the stomach; to churn food into chyme; the small intestine: the duodenum, jejunum, ileum; to enter the duodenum; to contain the pancreatic and biliary secretions; to disintegrate nutrients; nutrient absorption; facilitated by villi and microvilli; to transfer the undigested matter; the large intestine: the cecum, the colon, the rectum and anus; to absorb water and electrolytes; the final stage of waste formation; expulsion via the anus.

The accessory digestive organs: the liver; the largest gland; to lie inferior to the diaphragm, the right upper quadrate of the abdominal cavity; to aid digestion by secreting bile; to emulsify fats; to be delivered through the common bile duct; to be stored and concentrated in the gallbladder; to be located under the right lobe of the liver; to release bile when stimulated; the soft oblong pancreas; to lie behind the stomach; to secrete pancreatic juice; rich in enzymes and bicarbonates; to buffer acidic gastric juices; to enable the optimal functioning of digestive enzymes.

2. ***Practise translating the following text:***

Extrahepatic biliary atresia is a disease of the infant in which all or part of the extrahepatic bile ducts is destroyed or absent, leading to severe cholestasis and progressive biliary cirrhosis. There is no evidence that biliary atresia results from a failure in morphogenesis or recanalization of the common bile duct during embryonic development, the etiology of extrahepatic biliary atresia being unestablished despite considerable investigation.

For access to additional interactive exercises use the QR link in the Appendix.

REFERENCES

1. *MSD* Manual Consumer Version: 3-Models. Skeletal System. – URL: https://www.msdmanuals.com/home/pages-with-widgets/3d-models?mode=list (date of access: 04.02.2025).
2. *Microbe* Notes: Sagittal Plane: Definition, Regions, Movement, Applications. – URL: https://microbenotes.com/sagittal-plane/ (date of access: 08.06.2025).
3. *Wikipedia*: Anatomical Terms of Location. – URL: https://en.wikipedia.org/wiki/Anatomical_terms_of_location (date of access: 08.02.2025).
4. *Wikipedia*: Anatomical Terms of Bone. – URL: https://en.wikipedia.org/wiki/Anatomical_terms_of_bone (date of access: 08.02.2025).
5. *Human* Bio Media: Human Skull Anatomy Lateral View. – URL: https://www.humanbiomedia.org/human-skull-anatomy-lateral-view/ (date of access: 16.03.2025).
6. *Human* Bio Media: Human Skull Anatomy Anterior View. – URL: https://www.humanbiomedia.org/human-skull-anatomy-anterior-view/ (date of access: 16.03.2025).
7. *Registered* Nurse RN: Anatomy and Physiology. Skull Bones Mnemonic (Cranial and Facial Bones). – URL: https://www.youtube.com/watch?v=ocqoZyY12GM (date of access: 21.01.2025).
8. *OER* Services: Anatomy and Physiology I. The Vertebral Column/ – URL: https://courses.lumenlearning.com/suny-ap1/chapter/the-vertebral-column/ (date of access: 03.02.2025).
9. *OER* Services: Anatomy and Physiology I. The Thoracic Cage/ – URL: https://courses.lumenlearning.com/suny-ap1/chapter/the-thoracic-cage/ (date of access: 04.02.2025).
10. *OER* Services: Anatomy and Physiology I. Bones of the Upper Limb/ – URL: https://courses.lumenlearning.com/suny-ap1/chapter/bones-of-the-upper-limb/ (date of access: 04.02.2025).
11. *OER* Services: Anatomy and Physiology I. The Pelvic Girdle and Pelvis. – URL: https://courses.lumenlearning.com/suny-ap1/chapter/the-pelvic-girdle-and-pelvis/ (date of access: 04.02.2025).
12. *Professor* Dave: Anatomy and Physiology. The Skeletal System. – URL: https://www.youtube.com/watch?v=f-FF7Qigd3U (date of access: 08.02.2025).
13. *Brainly*: Biology. Community Answer. – URL: https://brainly.com/question/44547853 (date of access: 09.02.2025).
14. *Nationwide* Children's Hospital: Craniosynostosis: Causes, Symptoms, Diagnosis and Treatment. – URL: https://www.nationwidechildrens.org/conditions/craniosynostosis (date of access: 16.02.2025).
15. *MSD* Manual Consumer Version: Children's Health Issues. Craniosynostosis. – URL: https://www.msdmanuals.com/home/children-s-health-issues/birth-defects-of-the-face-and-skull/craniosynostosis (date of access: 08.02.2025).
16. *National* Library of Medicine: Developmental Dysplasia of the Hip. – URL: https://www.ncbi.nlm.nih.gov/books/NBK563157/ (date of access: 17.02.2025).
17. *MSD* Manual Consumer Version: 3-Models. Muscular System. – URL: https://www.msdmanuals.com/home/pages-with-widgets/3d-models?mode=list (date of access: 18.02.2025).
18. *WordPress*: Suzanne Kasparson's Blog: Illustrated Anatomy. – URL: https://suzannekasparson.wordpress.com/2012/05/07/illustrated-anatomy/ (date of access: 18.02.2025).
19. *Kenhub*: Muscles and muscle tissue. Types and Functions. – URL: https://www.kenhub.com/en/library/anatomy/muscles (date of access: 17.02.2025).

20. *Lecturio*: Medical. Muscle Tissue. – URL: https://www.lecturio.com/concepts/types-of-muscle-tissue/ (date of access: 10.02.2025).
21. *Wikimedia* Commons: Fascicle Muscle Shapes. – URL: https://commons.wikimedia.org/wiki/File:Fascicle_Muscle_Shapes.jpg (date of access: 07.06.2025).
22. *Professor* Dave: Anatomy and Physiology. The Muscular System. – URL: https://www.youtube.com/watch?v=21bgO104QVU (date of access: 25.02.2025).
23. *Physiopedia*: Rectus femoris. – URL: https://www.physio-pedia.com/Rectus_femoris (date of access: 30.08.2025).
24. *Physiopedia*: Pectoralis major – URL: https://www.physio-pedia.com/Pectoralis _major (date of access: 30.08.2025).
25. *Physiopedia*: Biceps Brachii. – URL: https://www.physio-pedia.com/ Biceps Brachii (date of access: 24.02.2025).
26. *Registered* Nurse RN: Anatomy and Physiology. Skeletal Muscle Tissue: Contraction, Sarcomere, Myofibril Anatomy Myology. – URL: https://www.youtube.com/watch?v=N0BEov3ZAjQ (date of access: 25.02.2025).
27. *Registered* Nurse RN: Anatomy and Physiology. Cardiac Muscle Tissue Review Lecture. – URL: https://www.youtube.com/watch?v=G8Q6Jm7mPCU (date of access: 24.02.2025).
28. *Registered* Nurse RN: Anatomy and Physiology. Smooth Muscle Tissue Anatomy. – URL: https://www.youtube.com/watch?v=AYkcBUGZt6g (date of access: 24.02.2025).
29. *Medical* News Today: Tendinosis: Symptoms, Causes and Treatment. – URL: https://www.medicalnewstoday.com/articles/320558 (date of access: 24.02.2025).
30. *Healthline*: Spondylitis vs. Spondilosis: Definitions, Symptoms, Outlook. – URL: https://www.healthline.com/health/ankylosing-spondylitis/spondylitis-vs-spondylosis (date of access: 24.02.2025).
31. *Healthline*: Dactylitis: Causes, Diagnosis, Treatment, and More. – URL: https://www.healthline.com/health/rheumatoid-arthritis/dactylitis#What-is-dactylitis-or-sausage-fingers (date of access: 25.02.2025).
32. *National* Library of Medicine: Juvenile Idiopathic Inflammatory Myopathies. – URL: https://pubmed.ncbi.nlm.nih.gov/30031496/ (date of access: 25.02.2025).
33. *National* Institute of Neurological Disorders and Stroke: Muscular Dystrophy. – URL: https://www.ninds.nih.gov/health-information/disorders/muscular-dystrophy (date of access: 25.02.2025).
34. *MSD* Manual Consumer Version: 3-Models. Cardiac Conduction System. – URL: https://www.msdmanuals.com/home/pages-with-widgets/3d-models?mode=list (date of access: 07.03.2025).
35. *Wikimedia* Commons: Diagram of the Human Heart. – URL: https://commons.wikimedia.org/wiki/File:Diagram_of_the_human_heart.svg (date of access: 01.04.2025).
36. *Seterra*: Map Quiz Game – The Heart. – URL: https://www.geoguessr.com/vgp/3805 (date of access: 01.03.2025).
37. *Kenhub*: Circulatory system: Structure, function, parts, diseases. – URL: https://www.kenhub.com/en/library/anatomy/circulatory-system (date of access: 02.03.2025).
38. *MSD* Manual Consumer Version: 3-Models. Cardiovascular System. – URL: https://www.msdmanuals.com/home/pages-with-widgets/3d-models?mode=list (date of access: 02.03.2025).
39. *OER* Services: Anatomy and Physiology II. Structure and Function of Blood Vessels. – URL: https://courses.lumenlearning.com/suny-ap2/chapter/structure-and-function-of-blood-vessels/ (date of access: 05.03.2025).
40. *Wikipedia*: Ventricular Septal Defect. – URL: https://en.wikipedia.org/wiki/Ventricular_septal_defect (date of access: 09.03.2025).

41. *OER* Services: Anatomy and Physiology II. Cardiac Cycle. – URL: https://courses.lumenlearning.com/suny-ap2/chapter/cardiac-cycle/ (date of access: 03.03.2025).
42. *National* Library of Medicine: Patent Foramen Ovale. – URL: https://www.ncbi.nlm.nih.gov/books/NBK493151/ (date of access: 09.03.2025).
43. *MSD* Manual Consumer Version: 3-Models. Respiratory System. – URL: https://www.msdmanuals.com/home/pages-with-widgets/3d-models?mode=list (date of access: 10.03.2025).
44. *Wikipedia*: Respiratory System. – URL: https://en.wikipedia.org/wiki/Respiratory_system (date of access: 14.03.2025).
45. *OER* Services: Anatomy and Physiology II. Organs and structures of the respiratory system. – URL: https://courses.lumenlearning.com/suny-ap2/chapter/organs-and-structures-of-the-respiratory-system/ (date of access: 10.03.2025).
46. *OER* Services: Anatomy and Physiology II. The Lungs. – URL: https://courses.lumenlearning.com/suny-ap2/chapter/the-lungs/ (date of access: 12.03.2025).
47. *MDPI* Open Access Journals: Acute Respiratory Failure in Children. – URL: https://www.mdpi.com/2227-9067/11/10/1232 (date of access: 15.03.2025).
48. *OER* Services: Anatomy and Physiology II. The Process of Breathing. – URL: https://courses.lumenlearning.com/suny-ap2/chapter/the-process-of-breathing-no-content/ (date of access: 14.03.2025).
49. *MSD* Manual Consumer Version: 3-Models. Digestive System. – URL: https://www.msdmanuals.com/home/pages-with-widgets/3d-models?mode=list (date of access: 15.03.2025).
50. *OER* Services: Anatomy and Physiology II. Overview of the digestive system. – URL: https://courses.lumenlearning.com/suny-ap2/chapter/overview-of-the-digestive-system/ (date of access: 16.03.2025).
51. *OER* Services: Anatomy and Physiology II. Accessory organs in digestion: the liver, pancreas and gallbladder. – URL: https://courses.lumenlearning.com/suny-ap2/chapter/accessory-organs-in-digestion-the-liver-pancreas-and-gallbladder/ (date of access: 16.03.2025).
52. *MSD* Manual Consumer Version: Overview of Congenital Gastrointestinal Anomalies. – URL: https://www.msdmanuals.com/professional/pediatrics/congenital-gastrointestinal-anomalies/overview-of-congenital-gastrointestinal-anomalies (date of access: 17.03.2025).

Additional Exercises

CONTENTS

Учебное издание

Сахнова Олеся Игоревна

АНГЛИЙСКИЙ ЯЗЫК. ПЕДИАТРИЯ

ENGLISH. PEDIATRICS

Учебное пособие

На английском языке

В двух частях

Часть 1

Ответственная за выпуск М. Н. Петрова
Переводчик О. И. Сахнова
Компьютерная вёрстка М. Г. Лободы

Подписано в печать 12.11.25. Формат 60×84/8. Бумага писчая «Марафон Бизнес».
Ризография. Гарнитура «Times».
Усл. печ. л. 13,02. Уч.-изд. л. 6,07. Тираж 270 экз. Заказ 813.

Издатель и полиграфическое исполнение: учреждение образования
«Белорусский государственный медицинский университет».
Свидетельство о государственной регистрации издателя, изготовителя,
распространителя печатных изданий № 1/187 от 24.11.2023.
Ул. Ленинградская, 6, 220006, Минск.