ГОСУДАРСТВЕННОЕ УЧРЕЖДЕНИЕ
ВЫСШЕГО ПРОФЕССИОНАЛЬНОГО ОБРАЗОВАНИЯ
«БЕЛОРУССКО-РОССИЙСКИЙ УНИВЕРСИТЕТ»

Кафедра «Белорусский, русский и иностранные языки»

АНГЛИЙСКИЙ ЯЗЫК

Задания для обучения чтению
профессионально-ориентированных текстов
для студентов специальности
20 10 00 «Биотехнические системы и технологии»

A

Могилев 2014

УДК 804.0
ББК 812.А
А 64

Рекомендовано к опубликованию
Центром менеджмента качества образовательной деятельности
ГУ ВПО «Белорусско-Российский университет»

Одобрено кафедрой «Белорусский, русский и иностранные языки» «21» июня 2014 г., протокол № 10

Составитель ст. преподаватель Е. В. Грицаева

Рецензент Е. Н. Мельникова

Задания для обучения чтению профессионально-ориентированных текстов предназначены для студентов специальности 20 10 00 «Биотехнические системы и технологии».

Основная цель данного издания – обучение чтению профессионально-ориентированной литературы. В процессе выполнения заданий решаются следующие задачи: пополнение словарного запаса специальной лексикой, формирование навыков и умений чтения и понимания текстов по специальности, совершенствование умений монологического и диалогического высказывания на основе проблемного обсуждения текстов.

Учебное издание

АНГЛИЙСКИЙ ЯЗЫК

Ответственный за выпуск	Е. Н. Мельникова
Технический редактор	И. В. Голубцова
Компьютерная верстка	Н. П. Полевничая

Подписано в печать . Формат 60×84/16. Бумага офсетная. Гарнитура Таймс. Печать трафаретная. Усл.-печ. л. . Уч.-изд. л. . Тираж 26 экз. Заказ №

Издатель и полиграфическое исполнение:
Государственное учреждение высшего профессионального образования
«Белорусско-Российский университет».
Свидетельство о государственной регистрации издателя,
изготовителя, распространителя печатных изданий
№ 1/156 от 24.01.2014.
Пр. Мира, 43, 212000, Могилев.

Unit 1

Text. Biomedical Engineering

Biomedical engineering is the application of engineering principles and methods to biomedical research and healthcare. In the field of health, aspects of engineering, physics, and technology are combined to understand and solve problems in life science research, medical diagnosis, medical therapy, and prevention of human diseases. It is a very diverse health field as it involves career specializations in the following areas: healthcare delivery; hospital safety; data processing and development of artificial organs, assist devices as well as performance evaluation of medical instrumentation. In these specializations there are two career occupations: the biomedical engineer and the biomedical equipment technician.

The biomedical engineer is primarily an engineer who has had specific training in various aspects of biology or medicine. There are three main specializations in which the biomedical engineer may work: bioengineering, medical engineering and clinical engineering. In one area of bioengineering the biomedical engineer researches the engineering aspects of biological (often nonmedical) systems, including the structure, function, and pathology of man and animals. In another, he or she is engaged in what is known as bioinstrumentation in which the application of electronics and measurement techniques to develop devices are used in diagnosis and treatment of disease. Computers, from microprocessors to those with extensive computing power, are becoming increasingly important in bioinstrumentation.

In medical engineering the biomedical engineer uses engineering concepts and technology to design and develop medical instrumentation, diagnostic and therapeutic devices, artificial organs and other equipment including lasers for surgery and cardiac pacemakers. They may also design computer-assisted instrumentation to monitor a patient's heart rate, electrocardiogram, or blood pressure. As a member of the healthcare team this type of biomedical engineer works closely with physicians in surgical and intensive care units.

In clinical engineering the biomedical engineer uses engineering concepts and technology to improve health care delivery systems in hospitals and clinical settings. He or she may use computer-assisted systems in monitoring patients and evaluating diagnostic tests, investigate accidents involving medical devices, evaluate new patient care technologies, and supervise and train the hospital staffn the proper use of instruments.

Task 1. Make up your own sentences with the following word combinations.

Heart chamber, severity of disease, pattern of blood flow, burst of ultrasound, backward flow.

Task 2. Complete the following sentences according to the text.

1. In the field of health,aspects of engineering,physics and technology are combined … .

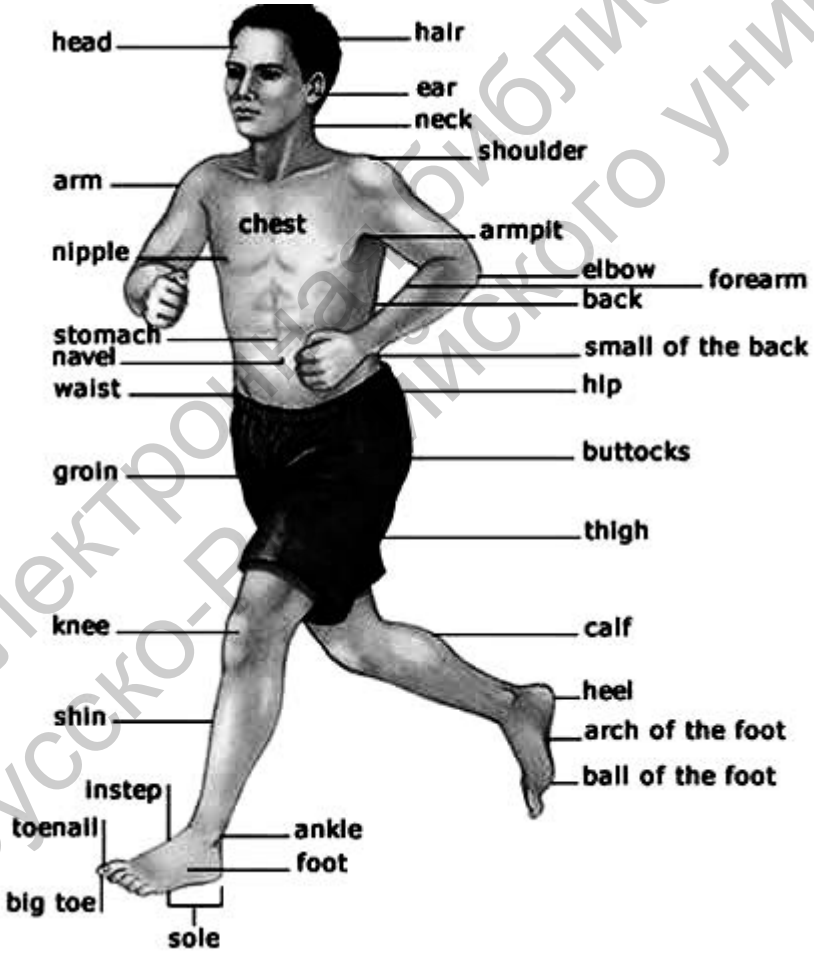
2. There are three main specializations in which the biomedical engineer may work … .

3. In medical engineering the biomedical uses engineering concepts and technology… .

4. In clinical engineering the biomedical engineer uses engineering concepts and technology … .

Unit 2

Task 1. Learn Human Body Parts.



Hair: grown on top of the head.
Head: part of the body that's on top of your neck.
Ears: on each side of the head and used for hearing.
Neck: connects the head to the body.
Shoulder: connects the to arm and to the base of the neck.

Arms: Used for touching things.
Chest: is the below the neck and above the stomach.
Arm pit: joint where the arm connects to the shoulder.
Nipple: small projection of a woman's or girl's breast.
Stomach: is used for digesting food.
Navel: The little hole in in the center of a person's belly.
Waist: Part of the body just above hips.
Elbow: is between the forearm and the upper arm.
Forearm: Is between the wrist and elbow.
Back: is rear surface of the body from the shoulders to the hips.
Small of the back: is the lower part of the back.
Hips: from the waist to the top of the leg.
Waist: is just above the hips.
Groin: above the thigh on either side of the body.
Buttocks: Sometimes called bottom or behind.
Thigh: part of the leg between the hip and the knee.
Knee: connects the lower and upper leg.
Calf: muscle at the back of the lower leg.
Shin: front of the leg below the knee.
Heel: is the back part of the foot below the ankle.
Arch of foot: where the bottom of the foot curves.
Ball of foot: The padded portion of the sole of the human foot between the toes and the arch.
Instep: The padded portion foot between the toes and the arch.
Toe nails: covers the end of the top of the toes.
Ankle: connects the foot to the leg.
Foot: the lower part of the leg below the ankle.
Big toe: each foot has 2 big toes.

Task 2. Say if it is true or false that.
1. Stomach is used for digesting food.
2. Thigh is a part of the leg between the hip and the knee.
3. Ankle is between the wrist and elbow.
4. Chest is below the neck and above the stomach.
5. Waist covers the end of the top of the toes.
6. Heel is the back part of the foot below the ankle.
7. Forearm is rear surface of the body from the shoulders to the hips.

Task 3. Explain the position of the following parts in a human body:
1. calf
2. elbow
3. arm pit
4. instep

Unit 3

Text. Internal Organs of the Human Body

The brain is the control centre of the nervous system and is located within the skull. Its functions include muscle control and coordination, sensory reception and integration, speech production, memory storage, and the elaboration of thought and emotion.

The liver lies on the right side of the abdominal cavity beneath the diaphragm. Its main function is to process the contents of the blood to ensure composition remains the same. This process involves breaking down fats, producing urea, filtering harmful substances and maintaining a proper level of glucose in the blood.

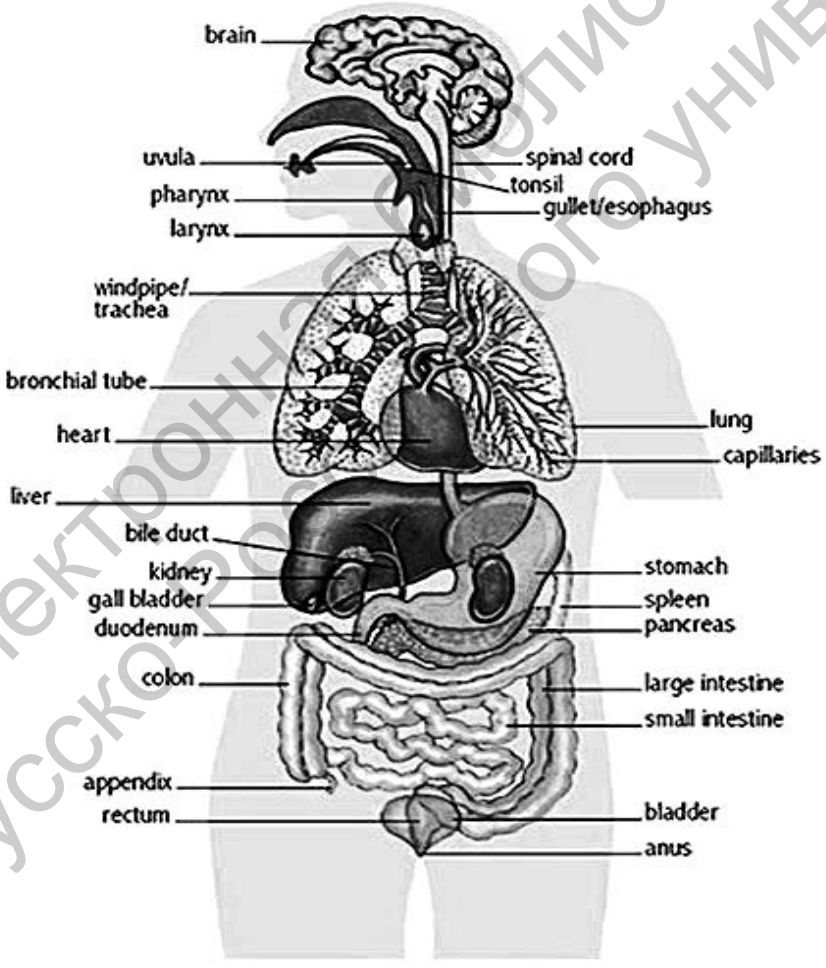


Fig. 1

The bladder is a muscular organ located in the pelvic cavity. It stretches to store urine and contracts to release urine.

The kidneys are two bean-shaped organs located at the back of the abdominal cavity, one on each side of the spinal column. Their function is to

maintain the body's chemical balance by excreting waste products and excess fluid in the form of urine.

The stomach is a muscular, elastic, pear-shaped bag, lying crosswise in the abdominal cavity beneath the diaphragm. Its main purpose is digestion of food through production of gastric juices which break down, mix and churn the food into a thin liquid.

The intestines are located between the stomach and the anus and are divided into two major sections: the small intestine and the large intestine. The function of the small intestine is to absorb most ingested food. The large intestine is responsible for absorption of water and excretion of solid waste material.

Task 1. Explain the function of kidneys in a human body.

Task 2. Prove the importance of liver function in a human body and discuss it with your groupmates.

Unit 4

Text. Echocardiography

Echocardiography is used to diagnose certain cardiovascular diseases. In fact, it is one of the most widely used diagnostic tests for heart disease. It can provide physicians with helpful information, including the size and shape of the heart, its pumping strength, and the location and extent of any damage to its tissues. It is especially useful for assessing diseases of the heart valves. It not only allows doctors to evaluate the heart valves, but it can detect abnormalities in the pattern of blood flow, such as the backward flow of blood through partly closed heart valves, known as regurgitation. By assessing the motion of the heart wall, echocardiography can help detect the presence and assess the severity of coronary artery disease, as well as help determine whether any chest pain is related to heart disease. Echocardiography can also help detect hypertrophic cardiomyopathy, in which the walls of the heart thicken in an attempt to compensate for heart muscle weakness. The biggest advantage to echocardiography is that it is noninvasive (doesn't involve breaking the skin or entering body cavities) and has no known risks or side effects. One of the main techniques in echocardiography is an echocardiogram that can be used to evaluate all four chambers of the heart. It can determine strength of the heart, the condition of the heart valves, the lining of the heart (the pericardium), and the aorta. It can be used to detect a heart attack, enlargement or hypertrophy of the heart, infiltration of the heart with an abnormal substance. Weakness of the heart, cardiac tumors, and a variety of other findings can be diagnosed with an echocardiogram.

Task 1. Find some more material about echocardiography and make a presentation.

Task 2. Complete the following sentences according to the text.

1. By assessing the motion of the heart wall, echocardiography can help … .
2. The biggest advantage to echocardiography is that … .
3. One of the main techniques in echocardiography is … .

Unit 5

Text. Creating an Image by Ultrasound

An echocardiogram is an ultrasound of the heart. Also known as a cardiac ultrasound, it uses standard ultrasound techniques to image two- dimensional slices of the heart. The latest ultrasound systems now employ 3D real-time imaging.

The instrument used to create an image by means of ultrasound is known as an echograph. The essential components include: the transducer, which is in contact with the tissue being examined and which both sends and receives the ultrasound. The transmitter regulates the sending the ultrasound by the transducer in the same way as a timer that controls the duration and frequency of the ultrasonic pulses emitted by the transducer. The transducer converts the returning echoes to electrical impulses which then go to the receiver and the signal amplifier. The returning echoes or impulses are processed so that they can be displayed on the cathode ray tube or oscilloscope.

One may use ultrasound to obtain an image of an object. Such acoustic imaging, sometimes called «echo ranging», depends primarily on the property of reflection together with pulsing of the ultrasonic beam. The electric energy is fed intermittently into the transducer so that the piezoelectric element sends out ultrasound for brief periods of time. The duration of each ultrasonic impulse, which may be as short as one microsecond, influences the shape of the ultrasonic pulse.

Following the emission or burst of ultrasound, the transducer becomes a receiver waiting to record any reflected ultrasound waves or echoes. Following a relatively long period, another burst of ultrasound is emitted and the cycle is repeated.

The rate with which the bursts of ultrasonic energy are emitted is the pulse repetition rate or pulse repetition frequency of the echograph. Commercial diagnostic echographs have repetition rates between 200 and 5000 sec. The M-mode examination has repetition rates of approximately 1000 to 2000 sec, whereas two-dimensional studies require repetition rates between 3000 and 5000 sec. Each burst of pulsed ultrasound may last only 1 to 2 msec. Thus, the transducer functions as a receiver nearly 99 % of the time.

Task 1. Answer the following questions.

1. What is echography? 2. How does this method help doctors in their work? 3. What is the greatest advantage of echography? 4. What is an echocardiogram used for? 5. What kind of technique is used in creating an echocardiogram? 6. What is an ultrasonic echograph designed for? 7. What are the two components of an ultrasonic echograph and what are their functions? 8. What influences the shape of the ultrasonic pulse? 9. What is the pulse repetition rate?

Task 2. Explain the importance of echocardiography as a remarkable method in cardiovascular diseases diagnostics.

Task 3. Look through the text again and make a list of echograph performance characteristics.

Task 4. Find some more information about echocardiogram as one of the most important noninvasive techniques to diagnose different heart diseases.

Unit 6

Text. Ultrasonic Scanners

Ultrasonic scans can be obtained in various ways. Two types of real-time two-dimensional scanners – mechanical and electronic – are available in medical diagnostic work. Mechanical scanners move the ultrasonic beam by way of an electric motor, whereas electronic systems steer the ultrasonic beam electronically. The mechanical systems may use a probe with an oscillating transducer whereby the active element moves through a given angle. A mechanical rotating transducer uses a series of active elements, usually three or our, mounted in a wheel located in a plastic housing filled with liquid. The principal advantage of the rotating transducer is that the active element is closer to the surface of the housing and theoretically can transmit and receive the ultrasonic beam with less interference from the ribs. The main advantages of the oscillating transducer are the only one ultrasonic element is required and the transducer is significantly less expensive. The oscillating transducer is also compatible with annular array transducers.

There are two basic electronic real-time scanners. The first such scanner uses a series of small elements that are fired sequentially. The sequential firing of the transducers essentially moves the ultrasonic beam linearly. This device, known as a multi-element linear array transducer, was probably the first commercially available, practical, real-time cardiac scanner and was responsible for much of the enthusiasm for two-dimensional echocardiography. Real-time

linear array scanners are now popular in abdominal, peripheral vascular, and small parts ultrasound examinations. For cardiac examinations, however, these scanners have the principal disadvantage of requiring a fairly large acoustic window. The large probe must overlie ribs and cannot be angled easily in the plane of the scan axis.

The most popular electronic real-time scanners use the phased array principle. This type of scanner uses a multi-element transducer to create a single ultrasonic beam, the direction of which can be altered by controlling the timing when each element is fired. A multi-element transducer has the capability of electronic focusing by firing the individual elements so that a curved or focused wave front is formed. Changing the sequence of the firing of each element alters the direction of the wave front. By using a computer or microprocessor to control the firing of each element, it is possible to control the direction of the ultrasonic beam rapidly and randomly. A similar technique can be used to change the direction of the angle of the wave front with a phased array system.

An important factor in scanning the heart is the relationship of the surface area and shape of that part of the transducer in contact with the patient. This feature is called the aperture or footprint of the transducer. The relationship of the aperture and the available echocardiographic window can be critical in a given patient. In this regard, the rotating mechanical transducer has a slight advantage over the oscillating mechanical transducer (see Fig. 1-21). The phased array transducer theoretically has an advantage over both mechanical systems. If the phased array transducer is small enough to fit within the intercostal spaces, the aperture can be quite small, with minimum interference from the ribs. It must be recognized, however, that all the elements of the phased array transducer must be in contact with the skin to obtain a proper scan. If the entire face of the transducer is not in contact or if part of it is overlying the rib, then greater distortion may occur with the phased array than with the mechanical approach. The apertures of some phased array transducers are larger than with mechanical systems.

Task 1. Make up your own sentences with the following words from the text:

a probe, a rib, an aperture, footprint, to alter, to steer.

Task 2. Look through the text again and compare mechanical and electronic types of scanners.

Task 3. Explain the dependence of aperture size on the quality of scanning.

Task 4. Explain the importance of ultrasonic scanners in medicine using your background knowledge and the information from the text.

Unit 7

Text. From Sound to Image

The creation of an image from sound is done in three steps – producing a sound wave, receiving echoes, and interpreting those echoes.

A sound wave is typically produced by a piezoelectric transducer encased in a probe. Strong, short electrical pulses from the ultrasound machine make the transducer ring at the desired frequency. The frequencies can be anywhere between 2 and 18 MHz. The sound is focused either by the shape of the transducer, a lens in front of the transducer, or a complex set of control pulses from the ultrasound scanner machine. This focusing produces an arc-shaped sound wave from the face of the transducer. The wave travels into the body and comes into focus at a desired depth.

Older technology transducers focus their beam with physical lenses. Newer technology transducers use phased array techniques to enable the sonographic machine to change the direction and depth of focus. Almost all piezoelectric transducers are made of ceramic.

Materials on the face of the transducer enable the sound to be transmitted efficiently into the body (usually seeming to be a rubbery coating, a form of impedance matching). In addition, a water-based gel is placed between the patient's skin and the probe.

The sound wave is partially reflected from the layers between different tissues. Specifically, sound is reflected anywhere there are density changes in the body: e.g. blood cells in blood plasma, small structures in organs, etc. Some of the reflections return to the transducer.

The return of the sound wave to the transducer results in the same process that it took to send the sound wave, except in reverse. The return sound wave vibrates the transducer, the transducer turns the vibrations into electrical pulses that travel to the ultrasonic scanner where they are processed and transformed into a digital image.

The sonographic scanner must determine three things from each received echo: 1. How long it took the echo to be received from when the sound was transmitted. 2. From this the focal length for the phased array is deduced, enabling a sharp image of that echo at that depth (this is not possible while producing a sound wave). 3. How strong the echo was. It could be noted that sound wave is not a click, but a pulse with a specific carrier frequency. Moving objects change this frequency on reflection, so that it is only a matter of electronics to have simultaneous Doppler sonography.

Once the ultrasonic scanner determines these three things, it can locate which pixel in the image to light up and to what intensity and at what hue if frequency is processed.

Task 1. Put questions to the text. Discuss the questions with the group. Express agreement/disagreement concerning the ideas of your fellow students Give your reasons to support your opinion.

Task 2. Give examples of some more methods of creating images.

Task 3. Find some more material about creating an image from sound or by ultrasound. Summarize the information on this issue to make a presentation.

Task 4. Determine the functions of infinitives in the following sentences and translate them into Russian accordingly.

1. To improve health care systems in hospitals and clinics, the biomedical engineer has to use computer-assisted systems in monitoring patients and in evaluating tests.
2. To improve health care systems in hospitals and clinics is the main goal that Department of Health and Human Services has set.
3. Computer-assisted medical instrumentation to be improved permanently along with new advances in science will be in great demand in hospitals all over the world.
4. To design and develop medical instrumentation, diagnostics and therapeutic devices, artificial organs, and other equipment including lasers for surgery and cardiac pacemakers, a biomedical engineer is supposed to have specific training in various aspects of biology and medicine as well in electronics, computer-assisted instrumentation and measurement techniques.
5. The team of biomedical engineer researchers discussed all technical details of new diagnostic and therapeutic devices to be designed within 2 years.
6. To design, develop and promote perfect medical instrumentation was announced as the most urgent priority of European Biomedical Engineering Society.
7. To use computer-assisted systems in monitoring patients, the biomedical engineer must have perfect professional skills in running computers for different purposes.
8. To use computer-assisted systems in monitoring patients is very important for evaluating diagnostic tests.
9. The Head Physician demonstrated new computer-assisted systems to be used by hospital staff this year.
10. To distinguish between dangerous and benign tumors, doctors might inject a molecular-imaging agent targeting an enzyme that is concentrated in malignant tumor.
11. To distinguish between malignant and benign tumors is very important for prompt and successful treatment.

12. Differences to be distinguished between benign and malignant tumors determine exactly what further specific treatment is necessary for every particular case.

Unit 8

Text. Doppler Echocardiography

Doppler echocardiography is a procedure which uses ultrasound technology to examine the heart. An echocardiogram uses high frequency sound waves to create an image of the heart while the use of Doppler technology allows determination the speed and direction of blood flow by utilizing the Doppler effect. It is a method for detecting the direction and velocity of moving blood within the heart.

The Doppler examination is based on the Doppler effect first described by Christian Johann Doppler in 1842.

Understanding Doppler echocardiography begins with an understanding of the Doppler principle.

If a source of sound is stationary, then the wavelength and frequency of the sound emanating from that source are constant. If, however, the source of the sound is moving toward one's ear, then the wavelength is decreasing and the frequency is increasing. If the source of sound moves away from the ear, then the wavelength is increasing and the frequency is decreasing. The classic example of this phenomenon is the sound originating from a moving train. As the train moves toward an individual, the sound coming from the train whistle is increasing in pitch or frequency. As the train passes the individual and moves away, the whistle from the train decreases in frequency or pitch.

Doppler echocardiography depends entirely on measurement of the relative change in the returned ultrasound frequency when compared to the transmitted frequency. Depending on the relative changes of the returning frequencies, Doppler echocardiographic systems measure these characteristics of disturbed flow: direction, velocity and turbulence. This enables examiners to differentiate between normal and abnormal flow patterns and, in some cases, to quantitate those characteristics that are helpful in determining the severity of abnormal flow states.

An echocardiogram can, within certain limits, produce accurate assessment of the direction of blood flow and the velocity of blood and cardiac tissue at any arbitrary point using the Doppler effect. One of the limitations is that the ultrasound beam should be as parallel to the blood flow as possible. Velocity measurements allow assessment of cardiac valve areas and function, any abnormal communications between the left and right side of the heart, any leaking of blood through the valves (valvular regurgitation), and calculation of the cardiac output. Contrast-enhanced ultrasound using gas-filled microbubble contrast

media can be used to improve velocity or other flow-related medical measurements.

Although «Doppler» has become synonymous with «velocity measurement» in medical imaging, in many cases it is not the frequency shift (Doppler shift) of the received signal that is measured, but the phase shift (when the received signal arrives).

This procedure is frequently used to examine children's hearts for heart disease because there is no age or size requirement. There are no known ill effects of the sound waves used during a standard echocardiogram.

The test is done by a cardiac sonographer. The examiner will put a few stick-on patches called electrodes on a patient for an electrocardiographic (EKG) tracing during the exam. He or she will also put a small handheld device (called a transducer) on the chest and abdomen. It sends and receives the sound waves and is connected by a cable to the ultrasound machine. The ultrasound machine is a computer that converts sound waves to pictures.

The examiner may select and show a variety of pictures on a TV screen. The picture normally changes when the transducer is moved. Portions of the test may be recorded on videotape or stored as computer files for later measurement, interpretation and storage as part of the patient record.

A patient doesn't need to make any special preparations. No feeling comes from the sound waves themselves; sometimes the skin feels mildly warm.

Task 1. Say if it is true or false.

1. Doppler examination is harmful to the patient.

2. If the source of sound moves away from the ear, then the wavelength is increasing.

3. Doppler echocardiography depends entirely on measurement of the relative change in the returned ultrasound frequency when compared to the transmitted frequency.

Task 2. Find the paragraph explaining fundamentals of the Doppler principle and explain how the Doppler effect is used in echocardiography.

Task 3. Point out the facts in the text which make the Doppler examination helpful and reliable.

Task 4. Express your own opinion on this issue adding some more information.

Unit 9

Text. The Doppler Principle and the Study of Cardiac Flows

Doppler echocardiography is primarily a technique for recording the manner in which blood moves within the cardiovascular system.

Blood flow through the heart and great vessels has certain characteristics that can be measured using Doppler instruments designed for medical use. For the purpose of understanding flow patterns in the heart, it is important to recognize the difference between laminar flow and turbulent (or disturbed) flow. Laminar flow is flow that occurs along smooth parallel lines in a vessel so that all the red cells in an area are moving at approximately the same speed and in the same direction. Due to friction, flow is always slightly slower near the walls of a vessel. With the pulsations of the heart, the red cells generally accelerate and decelerate at approximately the same speed. Flow in most of the cardiovascular system, including the heart and great vessels, is normally laminar and rarely exceeds the maximum velocity of 1,5 m/sec.

In contrast, turbulent or disturbed flow is present when there is some obstruction that results in a disruption of the normal laminar pattern. This causes the orderly movement of red blood cells to become disorganized and produces various whirls and eddies of differing velocities and directions. Obstruction to flow usually also results in some increase in velocity.

Thus, turbulent flow is characterized by disordered directions of flow in combination with many different red cell velocities. If the obstruction is significant, some of the red blood cells may be moving at higher velocities than normal and may reach speeds of 7 m/sec. Turbulent flow is usually an abnormal finding and is considered indicative of some underlying cardiovascular pathology (fig. 2).

Abnormal flows are therefore generally characterized by turbulence and any increase in velocity. As an example, consider blood flow in the ascending aorta during systole. If the aorta and aortic valve are normal, then this flow is laminar. However, the presence of a valvular stenosis will induce a turbulent flow pattern. A narrowed aortic valve orifice interrupts the parallel lines of normal laminar flow and produces turbulent flow. The resulting jet of blood creates a short segment within the proximal aorta with complex flow and velocity characteristics.

Task 1. Make up your own sentences with the following words from the text:

blood flow pattern – структура кровеносного потока
blood vessel – кровеносный сосуд
laminar flow – ламинарный, слоистый поток
turbulent flow – турбулентный, вихревой поток
red blood cells – красные кровяные тельца

valvular stenosis – клапанный стеноз
jet of blood – струя крови

Task 2. Specify the conditions when laminar and turbulent flows occur and dwell on different characteristics of these flows.

Task 3. Prove the importance of the Doppler examination.

Unit 10

Text. The Doppler Display

All Doppler systems have audio outputs and listening to this is very helpful during a Doppler examination. The changing velocities (frequencies) are converted into audible sounds and, after some processing, are emitted from speakers placed within the machine.

High pitched sounds result from large Doppler shifts and indicate the presence of high velocities, while low pitched sounds result from lesser Doppler shifts. Flow direction information (relative to the transducer) is provided by a stereophonic audio output in which flow toward the transducer comes out of one speaker and flow away from the transducer.

The audio output also allows the operator to easily differentiate laminar from turbulent flow. Laminar flow produces a smooth, pleasant tone because of the uniform velocities. Turbulent flow, because of the presence of many different velocities, results in a commonly high-pitched and whistling or harsh and raspy sound.

The audio output remains an indispensable guide to the machine operator for achieving proper orientation of the ultrasound beam, even when Doppler echocardiography is being used in conjunction with an ultrasound imaging technique. The trained ear can readily appreciate minor changes in spectral composition more readily than the eye, given the same information displayed graphically. The major limitation of audio Doppler outputs is the requirements for subjective interpretation and the lack of a permanent objective record. The audio output from a Doppler machine is not the same as that received by a stethoscope or a phonocardiogram. The sounds detected with a stethoscope are transmitted vibrations or pressure waves from the heart and great vessels that are believed to be the result of rapid accelerations and decelerations of blood. The Doppler audio output, in contrast, is an audible display of the Doppler frequency shift spectrum produced by red cells moving in the path of the ultrasound beam. It is a sound produced by the Doppler machine that does not occur in nature and, therefore, it does not originate in the heart.

The internal working of such systems are complex but the results are rather simple. When flow is laminar and all the red cells are accelerating and

decelerating at approximately the same velocities, a neat envelope of these similar velocities is recorded over time. When flow is turbulent, however, there are many different velocities detected at any one time (a wide spectrum of velocities). Such turbulence, produced by an obstruction to flow, results in the spectral broadening (display of velocities that are low, mid and high) and an increase in peak velocity as seen in disease states.

This display of the spectrum of the various velocities encountered by the Doppler beam is accomplished by very sophisticated microcomputers that are able to decode the returning complex Doppler signal and process it into its various velocity components. There are two basic methods for accomplishing this. The most popular is Fast Fourier Transform (FFT) and the other is called Chirp-Z Transform.

These are simply ways for deciphering, analyzing and presenting vast amounts of returning data.

Task 1. Find sentences which give the main idea of each paragraph of the text.

Task 2. Write your own plan of the text in logical consistency. Write an abstract and a summary in accordance with your plan.

Task 3. Find some more data on the Doppler examination to make this information more complete. Prepare and give a short presentation on the issue.

Task 4. Find Complex Objects and Complex Subject infinitive constructions in the following sentences and translate them into Russian.

1. A growing number of medical researchers consider today's diagnostic tools to be not accurate, invasive and even primitive.
2. X-ray images turned out to be not clear enough to differentiate a shadow cast by a calcium spot from a tumor.
3. Not long ago, fuzzy X-ray images and painful biopsies were thought to be the only way to diagnose deadly diseases.
4. Lately, powerful new imaging technologies are reported to have improved state of the art in diagnostics.
5. New diagnostic technologies are certain to ensure more accurate and less invasive tests and better treatment.
6. Until recently, breast biopsies were reported to have failed to find existing cancer cells and to diagnose the women's cancers.
7. Two-dimensional mammograms turned out to be also unable to show exactly the location of cancer calls.
8. To solve this problem biomedical engineers exploit the fact that biological tissues naturally fluoresce in response to stimulation by certain

wavelength of light while healthy and cancerous tissues are known to fluoresce differently.

9. Despite its potential, however, molecular imaging is said to have some technical challenges.

10. That's why researchers are known to be working hard to produce more clear images.

11. A new approach in this direction is assumed to be the use of high-resolution MRI (Magnetic Resonance Imaging) and computed- tomography scanners.

12. Many dangerous diseases were found to begin with subtle cellular changes, cell before structural abnormality, such as tumor, is detectable.

13. What's more, the new advanced imaging methods are presumed to be able to distinguish between diseases that look similar but actually involve different molecular malfunctions.

14. The established diagnostics industry and a few venture companies were reported to be making substantial investments in development of new medical imaging machines and systems.

15. We know them to invest much in molecular biology, chemistry and major pharmaceutical companies that are involved in development of new imaging agents.

16. One of new molecular-imaging agents (Apomate) is reported to give physicians a novel view of biological processes in the body on molecular level.

17. Powerful new imaging technologies are beginning to reveal the molecular signatures of many deadly diseases. New molecular imaging tools are sure to lessen uncertainty and anxiety for patients and to establish accurate diagnosis.

Unit 11

Text. The Work of a Human Heart

The heart is one of the most important organs in the human body, continuously pumping blood around our body through blood vessels.

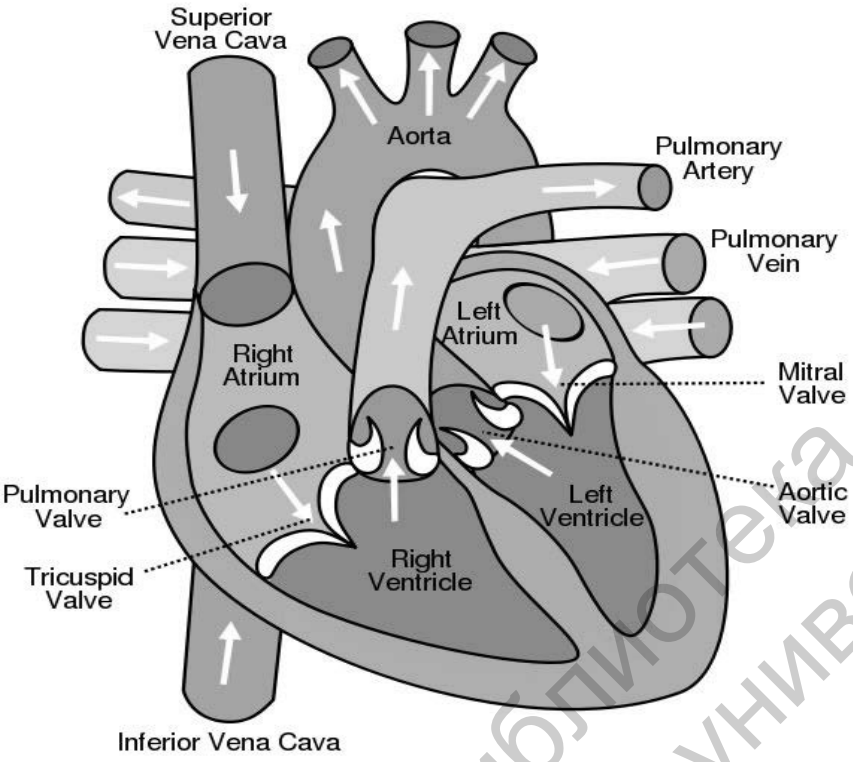
Your heart is located in your chest and is well protected by your rib cage.

The study of the human heart and its various disorders is known as cardiology.

The heart is made up of four chambers, the left atrium, right atrium, left ventricle and right ventricle.

There are four valves in the human heart, they ensure that blood only goes one way, either in or out.

Blood that leaves the heart is carried through arteries. The main artery leaving the left ventricle is the aorta while the main artery leaving the right ventricle is the pulmonary artery.



Blood going towards the heart is carried through veins. Blood coming from the lungs to the left atrium is carried through the pulmonary veins while blood coming from the body to the right atrium is carried through the superior vena cava and inferior vena cava.

You might have felt your own heart beating, this is known as the cardiac cycle. When your heart contracts it makes the chambers smaller and pushes blood into the blood vessels. After your heart relaxes again the chambers get bigger and are filled with blood coming back into the heart.

Electricity going through your heart makes the muscle cells contract.

You might have watched television shows or movies where a patient in a hospital is attached to an electrocardiogram (ECG). You might recognize it as the machine with a line moving across a screen that occasionally spikes (or remains flat when a patient is dying). This machine can measure the electricity going through a patient's heart. A doctor can use the information to know when a patient is having heart rhythm problems or even a heart attack.

Heart attacks cause scar tissue to form amongst normal heart tissue, this can lead to further heart problems or even heart failure.

Task 1. Explain the position of a heart in a human body.

Task 2. Prove that ECG can help a doctor to get the proper information about patient's heart.

Task 3. Make a short summary of the text.

Unit 12

Text. An Artificial Heart

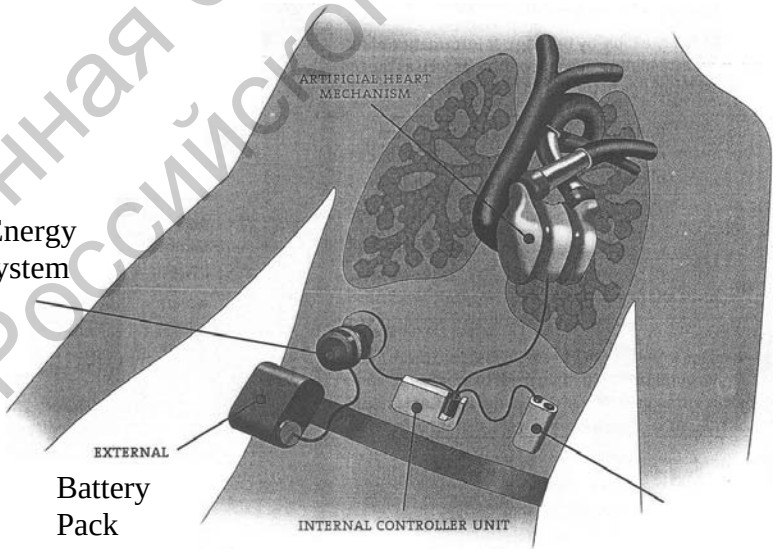
An artificial heart is made of titanium and plastic. It's for patients with very serious heart problems, who are waiting for a heart transplant.

It contains a hydraulic pump and a valve which lets the hydraulic fluid move from one side of the heart to the other. When the fluid moves to the right, blood is pumped to the lungs. When the fluid moves to the left, blood is pumped to the rest of the body.

The system has two batteries: one internal, inside the patient's body, and one external. The internal battery lasts up to forty minutes. This is long enough for the patient to have a shower or to change the external battery. The external battery lasts four to five hours.

The external battery provides power using a wireless energy transfer system. A coil on the patient's skin induces power in a coil inside the body. This operates the controller and charges the internal battery. The controller contains a microprocessor which decides the best heart rate for the patient at any time.

Task 1. Look at the diagram of an artificial heart system, and answer the questions.



Wireless Energy Transfer system

Battery Pack

Internal Rechargeable Battery

1. What kind of patient is the artificial heart for?
2. What does the artificial heart contain?
3. Why are there 2 batteries?
4. How is the internal battery charged?
5. What is the controller for?

Unit 13

Text. A Pacemaker

A pacemaker (or artificial pacemaker), is a medical device that uses electrical impulses, delivered by electrodes contracting the heart muscles, to regulate the beating of the heart. The primary purpose of a pacemaker is to maintain an adequate heart rate, either because the heart's natural pacemaker is not fast enough, or there is a block in the heart's electrical conduction system. Modern pacemakers are externally programmable and allow the cardiologist to select the optimum pacing modes for individual patients. Some combine a pacemaker and defibrillator in a single implantable device. Others have multiple electrodes stimulating differing positions within the heart to improve synchronization of the lower chambers (ventricles) of the heart.

In 1926, Dr Mark C Lidwell of the Royal Prince Alfred Hospital of Sydney devised a portable apparatus which «plugged into a lighting point» and in which «One pole was applied to a skin pad soaked in strong salt solution» while the other pole «consisted of a needle insulated except at its point, and was plunged into the appropriate cardiac chamber». «The pacemaker rate was variable from about 80 to 120 pulses per minute, and likewise the voltage variable from 1,5 to 120 volts».

In 1932, American physiologist Albert Hyman, working independently, described an electro-mechanical instrument of his own, powered by a spring-wound hand-cranked motor. Hyman himself referred to his invention as an «artificial pacemaker», the term continuing in use to this day.

Modern pacemakers usually have multiple functions. The most basic form monitors the heart's native electrical rhythm. When the pacemaker does not detect a heartbeat within a normal beat-to-beat time period, it will stimulate the ventricle of the heart with a short low voltage pulse. This sensing and stimulating activity continues on a beat by beat basis.

Task 1. Complete the following sentences according to the text.

1. The primary purpose of a pacemaker is … .
2. Modern pacemakers are extremely programmable and allow … .
3. Modern pacemakers usually have … .
4. When the pacemaker does not detect a heartbeat within a normal beat-to beat period, it will … .

Unit 14

Text. The Work of Human Lungs

The lungs are a pair of spongy, air-filled organs located on either side of the chest (thorax). The trachea (windpipe) conducts inhaled air into the lungs through its tubular branches, called bronchi. The bronchi then divide into smaller and smaller branches (bronchioles), finally becoming microscopic.

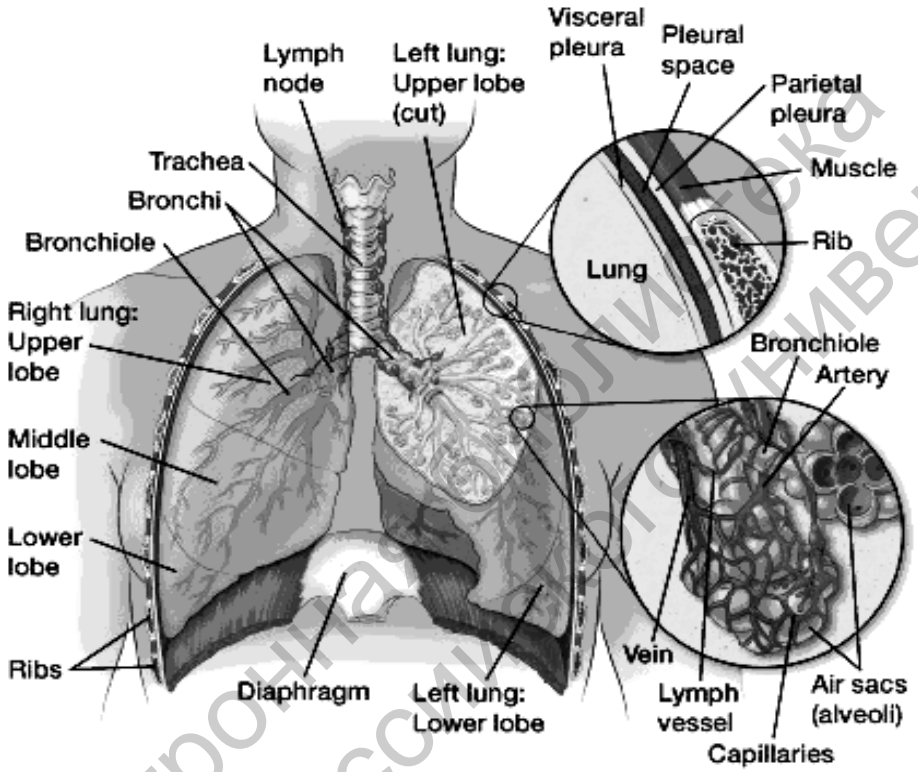


Fig. 2

The bronchioles eventually end in clusters of microscopic air sacs called alveoli. In the alveoli, oxygen from the air is absorbed into the blood. Carbon dioxide, a waste product of metabolism, travels from the blood to the alveoli, where it can be exhaled. Between the alveoli is a thin layer of cells called the interstitium, which contains blood vessels and cells that help support the alveoli.

The lungs are covered by a thin tissue layer called the pleura. The same kind of thin tissue lines the inside of the chest cavity also called pleura. A thin layer of fluid acts as a lubricant allowing the lungs to slip smoothly as they expand and contract with each breath.

Task 1. Memorize the names of the parts of human lungs on fig. 2.

Task 2. Describe the position of lungs in a human body.

Unit 15

Text. The Ultracane

Blind people or people … often use a cane to feel their way when walking. The Ultracane is a new type of cane … . It uses echolocation, like a bat, to detect objects around the blind person. Some people call it the Batcane. The cane transmits ultrasound signals. These are reflected by objects … . Sensors on the cane receive the reflected signals which are passed to a microprocessor … .

There are four buttons on the handle of the cane - the two … are on the top, and the two which are for objects on the left and right are on the back. These buttons vibrate when an object is detected. The larger the object, the larger the vibration.

People … say that with a little practice they can use these vibrations to make a mental map of their surroundings as they walk. Because the cane uses vibrations, not noise, they can also use their ears for additional information about their surroundings. The engineers … are now planning new uses of echo-location to help the blind.

Task 1. Fill the gaps in the description of the Ultracane with information a-g.

Add who when the information describes people. Add which for things.

a invented the cane
b calculates the position and size of the object
c are near the blind person
d have tried the cane
e helps blind people to avoid obstacles in their path
f cannot see well
g are for objects in front and overhead

Unit 16

Text. A Wheelchair

Today, there are a number of different wheelchairs available, but the most common is the steel framed wheelchair. This type of manual wheelchair shares the E & J design, which was developed over eighty years ago, and is the type found in most hospitals. They are also referred to as Traditional wheelchairs, standard wheelchairs, or Conventional Wheelchairs. Below, you will find a diagram of a traditional wheelchair and a list of its components.

1. Footrest: The footrests, which are also called footplates and footpedals, can be adjusted to accommodate different lengths and can also be rotated.

2. Legrest: The legrest extends from the front of the wheelchair and the footrest is attached to the legrest.

3. Front Rigging: The front rigging refers to the footrest arm and the legrest as a single unit. In most conventional wheelchairs, the front rigging can be removed, but this is not always the case in less expensive models. It can also often be elevated to provide an elevated leg rest.

4. Frame: The conventional wheelchairs frame is made out of cold rolled steel that is chrome plated. The frame is the heaviest part of the wheelchair and it can weigh up to 50 pounds, but a stainless steel frame is also available that weighs about ten pounds less.

5. Seat: The seat, like the other fabric parts of a conventional wheelchair, is made from vinyl and uses a sling design. Multiple colors are often available and the vinyl fabric makes it very easy to clean.

6. Metal Skirt: The metal skirt is installed on either side of a conventional wheelchair between the armrests. It is designed to protect the users' clothes from dirt, moisture, and debris that can be kicked up by the wheels. Metal Skirts also prevent the users clothes from becoming caught in the wheelchair.

7. Armrests: There are two types of armrests: Full length and Desk Type. The armrests are secured to the frame in two places and are designed to be very sturdy.

8. Backrest: The Backrest height is fixed and typically is about 16 BS inches high. However, reclining backrests and extending backrest are available as

options for most conventional wheelchairs.

9. Push handles: The Push Handles are located on the back of the wheelchair and rubber handles are installed to make them more comfortable.

10. Push Axle: The Push Axle ensures provides support for the push handles and is at a fixed height.

11. Rear Wheels: Typically the rear wheels will be 24 inches in diameter. Both Pneumatic and Solid tires are used. The rear wheels are used for manual propulsion of the wheelchair.

12. Handrims: The handrims extend outwards from the rear wheel. They are typically chrome plated and are used to propel the wheelchair.

13. Brakes: The brakes are located on the large rear wheels. They are typically located on the front of the wheel next to the bottom of the seat.

14. Tipping Lever: The tipping lever extends from the bottom of the frame and is designed to make it easier to move the wheelchair over obstacles, such as curbs. The person pushing the wheelchair will put weight on the tipping lever, which causes the wheelchair to tip backwards.

15. Crossbars: The crossbars are located under the seat and allow the wheelchair to be easily folded for storage and transportation. There are typically no locks to keep the conventional wheelchair from folding, but instead the weight of the user prevents the wheelchair from being folded.

16. Caster Wheels: The wheels of a conventional wheelchair are called caster wheels and are typically 8 inches in diameter. They are typically made of solid rubber, but for outdoor use pneumatic tires are recommended.

17. Anti-Tip Casters (Not Pictured): Anti-Tip Casters are not always present on conventional wheelchairs, but they can usually be added. They are designed to prevent the wheelchair from tipping over backwards. In the event that the wheelchair tips over too far, the anti-tip casters make contact with the ground, preventing it from completely tipping over.

Task 1. Say if it is true that.

1. The frame extends from the front of the wheelchair.
2. Handrims extend outwards from the rear wheel.
3. Metal skirt is installed on either side of a conventional wheelchair between the armrests.

Task. 2. Make a summary of the text.

Unit 17

Text. A PET Scan

Positron emission tomography–computed tomography (better known as PET-CT or PET/CT) is a imaging technique using a device which combines in a single gantry system both a positron emission tomography (PET) scanner and an x-ray computed tomography (CT) scanner, so that images acquired from both devices can be taken sequentially, in the same session, and combined into a single superposed (co-registered) image. Thus, functional imaging obtained by PET, which depicts the spatial distribution of metabolic or biochemical activity in the body can be more precisely aligned or correlated with anatomic imaging obtained by CT scanning. Two- and three-dimensional image reconstruction may be rendered as a function of a common software and control system.

PET-CT has revolutionized medical diagnosis in many fields, by adding precision of anatomic localization to functional imaging, which was previously lacking from pure PET imaging. For example, many diagnostic imaging procedures in oncology, surgical planning, radiation therapy and cancer staging have been changing rapidly under the influence of PET-CT availability, and centers have been gradually abandoning conventional PET devices and substituting them by PET-CTs. Although the combined/hybrid device is considerably more expensive, it has the advantage of providing both functions as stand-alone examinations, being, in fact, two devices in one.

The only other obstacle to the wider use of PET-CT is the difficulty and cost of producing and transporting the radiopharmaceuticals used for PET imaging, which are usually extremely short-lived (for instance, the half life of radioactive fluorine, used to trace glucose metabolism (using fluoro-deoxyglucose, FDG) is two hours only. Its production requires a very expensive cyclotron as well as a production line for the radiopharmaceuticals.

Task 1. Read the first passage of the text and express its main idea.

Task 2. Say what the main obstacle is to the wider use of PET-CT.

Unit 18

Text. A Hearing Aid

A hearing aid is an electroacoustic device which is designed to amplify sound for the wearer, usually with the aim of making speech more intelligible, and to correct impaired hearing as measured by audiometry. In the United States, Earlier devices, known as ear trumpets or ear horns, were passive funnel-like amplification cones designed to gather sound energy and direct it into the ear canal. Similar devices include the bone anchored hearing aid, and cochlear implant.

Recent hearing aids include wireless hearing aids. One hearing aid can transmit to the other side so that pressing one aid's program button simultaneously changes the other aid, so that both aids change background settings simultaneously. FM listening systems are now emerging with wireless receivers integrated with the use of hearing aids. A separate wireless microphone can be given to a partner to wear in a restaurant, in the car, during leisure time, in the shopping mall, at lectures, or during religious services. The voice is transmitted wirelessly to the hearing aids eliminating the effects of distance and background noise. FM systems have shown to give the best speech understanding in noise of all available technologies. FM systems can also be hooked up to a TV or a stereo.

Task 1. Make definitions of each device in column A of the table by matching them with the information in column B.

The primary purpose of a pacemaker … .	use by visually impaired people that delivers a «step forward» in assistive technology.
An artificial heart contains … .	is to maintain an adequate heart rate.
The Ultracane is an electronic mobility aid for … .	also by people with cardiovascular conditions … .
A PET scan uses … .	a hydraulic pump and a valve which lets the hydraulic fluid move from one side to the other.
A motorized wheelchair is used not only by people with «traditional» impairments, but … .	a small amount of radioactive material (tracer)
Diagnostic sonography is a device … .	for visualizing subcutaneous body structures including tendons, muscles, joints, vessels.
Modern hearing aids are … .	the cleaning and shaping of root canals.
Ophthalmoscopy is a test … ю	small, comfortable and nearly invisible.
A dental drill may also be used in … .	that allows a health professional to see inside the fundus of the eye.

Task 2. Make up the sentences as follows.

A pacemaker is a device for people.
The people have heart problems.
We can join these sentences like this.
***A pacemaker** is a device for people who have heart problems.*
Compose the sentences.
The Ultracane is a device.
The device helps blind people.
***The Ultracane** is a device…*

A cardiac patient is a person.
The person is being treated for a heart problem.
A cardiac patient is a person … .

This is a scanner.
It reads books.
This is a scanner … .

There is a lab technician.
He works in the laboratory with me.
There is a lab technician … .

X-ray camera is a device.
The device specializes in taking and prosessing X-rays.
X-ray is a device … .

Kidney machine is a device.
The device helps people with damaged kidneys.
Kidney machine is a device … .

Bioengineer is a person.
The person applies engineering principles to medical problems.
Bioengineer is a person … .

CAT scanner is a device.
The device takes 3-D images of the brain and other organs.
CAT scanner is a device …

Unit 19

Text. What is Nanotechnology?

Nanotechnology refers to the interactions of cellular and molecular components and engineered materials – typically clusters of atoms, molecules, and molecular fragments – at the most elemental level of biology. Such nanoscale objects – typically, though not exclusively, with dimensions smaller than 100 nanometers – can be useful by themselves or as part of larger devices containing multiple nanoscale objects. At the nanoscale, the physical, chemical, and biological properties of materials differ fundamentally and often unexpectedly from those of the corresponding bulk material because the quantum mechanical properties of atomic interactions are influenced by material variations on the nanometer scale. In fact, by creating nanometer-scale structures, it is possible to control fundamental characteristics of a material, including its melting point, magnetic properties, and even color, without changing the material's chemical composition.

Nanoscale devices and nanoscale components of larger devices are of the same size as biological entities. They are smaller than human cells (10,000 to 20,000 nanometers in diameter) and organelles and similar in size to large biological macromolecules such as enzymes and receptors — hemoglobin, for example, is approximately 5 nm in diameter, while the lipid bilayer surrounding cells is on the order of 6 nm thick. Nanoscale devices smaller than 50 nanometers can easily enter most cells, while those smaller than 20 nanometers can transit out of blood vessels. As a result, nanoscale devices can readily interact with biomolecules on both the cell surface and within the cell, often in ways that do not alter the behavior and biochemical properties of those molecules. From a scientific viewpoint, the actual construction and characterization of nanoscale devices may contribute to understanding carcmogenesis.

Noninvasive access to the interior of a living cell affords the opportunity for unprecedented gains on both clinical and basic research frontiers. The ability to simultaneously interact with multiple critical proteins and nucleic acids at the molecular scale should provide better understanding of the complex regulatory and signaling networks that govern the behavior of cells in their normal state and as they undergo malignant transformation. Nanotechnology provides a platform for integrating efforts in proteomics with other scientific investigations into the molecular nature of cancer by giving researchers the opportunity to simultaneously measure gene and protein expression, recognize specific protein structures and structural domains, and follow protein transport among different cellular compartments. Similarly, nanoscale devices are already proving that they can deliver therapeutic agents that can act where they are likely to be most effective, that is, within the cell or even within specific organelles. Yet despite their small size, nanoscale devices can also hold tens of thousands of small molecules, such as a contrast agent or a multicomponent diagnostic system capable of assaying a cell's metabolic state, creating the opportunity for

unmatched sensitivity in detecting cancer in its earliest stages. For example, current approaches may link a monoclonal antibody to a single molecule of an MRI contrast agent, requiring that many hundreds or thousands of this construct reach and bind to a targeted cancer cell in order to create a strong enough signal to be detected via MRI. Now imagine the same cancer-homing monoclonal antibody attached to a nanoparticle that contains tens of thousands of the same contrast agent – if even one such construct reaches and binds to a cancer cell, it would be detectable.

Task 1. Answer the following questions.

1. What does nanotechnology refer to? 2. What do some properties of materials differ from the corresponding bulk material? 3. What are the quantum mechanical properties of atomic interactions influenced by? 4. How is it possible to control fundamental characteristics of a material? 5. What gives better understanding of the mechanism that governs the behavior of cells? 6. What opportunities does nanotechnology offer to the medical researchers?

Task 2. Put down the main idea of each paragraph in a simple sentence.

Task 3. Explain the dependence of nanodevices properties on their size.

Task 4. Make your own assessment of nanodevices and their role in diagnostics and treatment of dangerous diseases.

Unit 20

Text. Nanotechnology and Cancer Therapy

Nanoscale devices have the potential to radically change cancer therapy for the better and to dramatically increase the number of highly effective therapeutic agents. Nanoscale constructs, for example, should serve as customizable, targeted drug delivery vehicles capable of ferrying large doses of chemotherapeutic agents or therapeutic genes into malignant ligand – ion or molecule that acts as the electron – donor partner in one or more coordination bonds.

Cells while sparing healthy cells, which would greatly reduce or eliminate the often unpalatable side effects that accompany many current cancer therapies. Already, research has shown that nanoscale delivery devices, such as dendrimers (spherical, branched polymers), silica-coated micelles, ceramic nanoparticles, and cross-linked liposomes, can be targeted to cancer cells. This is done by attaching monoclonal antibodies or cell-surface receptor ligands that bind specifically to molecules found on the surfaces of cancer cells. Once they reach their target, the nanoparticles are rapidly taken into cells. As efforts in proteomics and genomics uncover other molecules unique to cancer cells, targeted nanoparticles could

become the method of choice for delivering anticancer drugs directly to tumor cells and their supporting endothelial cells. Eventually, it should be possible to mix and match anticancer drugs with any one of a number of nanotechnology-based delivery vehicles and targeting agents, giving researchers the opportunity to fine-tune therapeutic properties without needing to discover new bioactive molecules.

On an equally unconventional front, efforts are focused on constructing robust «smart» nanostructures that will eventually be capable of detecting malignant cells *in vivo*, pinpointing their location in the body, killing the cells, and reporting back that their payload has done its job. The operative principles driving these current efforts are modularity and multifunctionality, i.e., creating functional building blocks that can be snapped together and modified to meet the particular demands of a given clinical situation. A good example from the biological world is a virus capsule, made from a limited set of proteins, each with a specific chemical functionality, that comes together to create a multifunctional nanodelivery vehicle for genetic material.

While such work with naturally existing nanostructures is promising, chemists and engineers have already made substantial progress turning synthetic materials into multifunctional nanodevices. Dendrimers, 1- to 10-nanometer spherical polymers of uniform molecular weight made from branched monomers, are proving particularly adept at providing multifunctional modularity.
Both *in vitro* and *in vivo* experiments showed that this nanodevice delivered its therapeutic payload specifically to *folate* receptor-positive cells while simultaneously labeling these cells for fluorescent detection. Subsequent work, in which a fluorescent indicator of cell death was linked to the dendrimer, provided evidence that the therapeutic compound was not only delivered to its target cell but also produced the desired effect. Already, some dendrimer-based constructs are making their way toward clinical trials for treating a variety of cancers.

Such multifunctional nanodevices, sometimes referred to as nanoclinics, may also enable new types of therapeutic approaches or broader application of existing approaches to killing malignant cells. They hold out the possibility of adically changing the practice of oncology, perhaps providing the means to survey the body for the first signs of cancer and deliver effective therapeutics during the earliest stages of the disease.

An important aspect of biomedical nanotechnology research is that most systems are being designed as general platforms that can be used to create diverse set of multifunctional diagnostic and therapeutic devices.

With the focus on modularity and multifunctionality, one goal is to create and characterize platform technologies that can be mixed and matched with new targeting agents that will come from large-scale proteomics programs already in action and therapeutics both old and new. Accomplishing this goal, however, will require that engineers and biologists work hand in hand to combine the best of both of their worlds in the fight against cancer.

Task 1. Describe different types of nanoscale devices.

Task 2. Remember Latin contractions such as e. g., i. e., et. al., viz., etc. Learn how to read them in Latin. Use them in your own examples.

Task 3. Propose and write your own plan of the text in logical consistency.

Task 4. Discuss nanotechnology method with your fellow students.

Список литературы

1 **Glendinning, Eric H.** Information Technology. Student's Book + CD / E. H. Glendinning, J. McEwan. – Oxford : University Press, 2002. – 133 с.

2 **Стасенко, И. В.** Английский язык : обучение чтению литературы на английском языке по специальности «Биомедицинская техника» : учеб.-метод. пособие / И. В. Стасенко, М. В. Куликова, И. Г. Сафарова. – М. : МГТУ им. Н. Э. Баумана, 2010. – 42 с. : ил.

3 Wikipedia. The free encyclopedia [Электронный ресурс]. – Режим доступа : //http : // en.wikipedia.org. – Дата доступа : 20.06.2014.