



right atrium

right ventricle

pulmonary valve

aorta

left atrium

superior vena cava

left ventricle

pulmonary artery

tricuspid valve

pulmonary vein

mitral valve

aortic valve

Unit 3

THE CARDIOVASCULAR SYSTEM

A. Warm-up

From the very first heartbeat, to the last heartbeat, it is the heart that marks the beginning and the end of our human existence. The heart pumps the blood that reaches every cell in the human body, carrying vitally important elements.

Working in pairs or threes try to answer the questions given below.

1. What makes the circulatory system of great importance? What are its functions?
2. What two major systems does the circulatory system comprise?
3. What structural elements does the cardiovascular system consist of?
4. What structural elements is the lymphatic system composed of?
5. What other systems does the cardiovascular system cooperate with and how?

Compare and discuss your answers to sum up the information gathered.

B. Reading and Vocabulary Building

Study the circulatory system anatomy related vocabulary given on the margin.

Task 1

Complete the text with the vocabulary given below.

PART ONE

connecting • concerned (2) • consists • carry (2) • includes • composed

The **circulatory system** is an organ system which is often considered as of the **cardiovascular system** with the distribution of blood and the **lymphatic system** with the distribution of lymph.

The **cardiovascular system** of the heart and the blood vessels. The latter arteries, veins and capillaries. With the exception of the pulmonary artery, all arteries oxygenated blood rich in nutrients. All veins, with the exception of pulmonary veins, deoxygenated blood rich in waste products. Capillaries are minute blood vessels the ends of the smallest arteries (arterioles) with the beginnings of the smallest veins (venules).

PART TWO

regulated • composed • situated • valve (3) • prevent • divides • middle • innermost • outmost • pumps • receives • consisting

The heart is a four-chamber organ in the middle mediastinum. An oblique, longitudinal septum the heart into two parts, each of an atrium which blood from veins and a ventricle which blood into arteries. The wall of the heart is of three layers of

Vocabulary

cardiovascular
sercowonaczyniowy
circulatory krążeniowy
deoxygenated odlenowany
vessel naczynie
vein żyła
mediastinum śródpiersie
serous surowiczy
valve zastawka
tricuspid trójdzielny
thymus grasicca
diastole rozkurcz serca
systole skurcz serca

Vocabulary

nutrients składniki odżywcze
wastes odpady
sinoatrial node węzeł
zatokowoprzedsiolkowy
angina pectoris dusznica bolesna
atrium przedsionek
chamber komora
contraction skurcz
viscosity lepkość
flow velocity prędkość przepływu
severity natężenie, intensywność,
stopień
blood loss utrata krwi
depletion nadmierna utrata
składnika ustroju
aortic arch łuk aorty
permeability przepuszczalność

C. More Vocabulary Work

Study the cardiovascular system physiology related vocabulary.

Task 3

Complete the text with the vocabulary given below.

PART ONE

diffuse (2) • determined • allowing • flows • carrying • reaches

The blood through blood vessels and all cells of the body with it oxygen, carbon dioxide and glucose which can through the walls of capillaries thus for the exchange of gases, the elimination of metabolic wastes, the passage of nutrients and the generation of energy necessary for the body to function. The diffusion or movement of fluid across the capillary wall is by a combination of hydrostatic pressure and osmotic pressure. Water can across the capillary wall by filtration of osmosis.

PART TWO

controlled • pumps • is • bring • situated • sending • making • coordinates • contract • prove

The heart approximately 15 000 litres of blood per day. The cardiac muscle solely responsible for the pumping action of the heart an involuntary, autorhythmic muscle. It is not by either our will or the nervous system. The sinoatrial node (SN) in the right atrium the action of the cardiac muscle fibres by electrical signals along the conduction system to the four chambers of the heart and them subsequently Any disturbances in the contraction and relaxation of the cardiac muscle fibres of the heart about disturbances in the supply of oxygen to all vital

organs of the body and the evacuation of carbon dioxide which may fatal to the person concerned.

PART THREE

caused • die • referred • result • propelled • receive • denied • weaken • needs

Like other muscles, the heart muscle nutrients and oxygen to contract. These are supplied by coronary arteries which highly oxygenated blood from the aorta. Any blockage of any segment of coronary arteries causing reduced blood supply may in severe pain referred to as angina pectoris. The heart muscle or its part may actually when blood supply to the area is compromised and it is nutrients. This condition is to as myocardial infarction. Changes to the heart muscle by insufficient blood supply are irreversible and the pumping function of the heart and thus not only the rate at which blood is into the cardiovascular system but also the volume of blood in circulation.

PART FOUR

by • where • during (2) • in (2) • about (2) • at • close to • depending on

Blood pressure varies the phase of the heart beat and the area. It is the highest the place of blood ejection, i.e. the right ventricle. It is the lowest the venae cavae enter the right atrium. The blood pressure the right atrium is called the central venous pressure. The blood pressure in the arteries ventricular contraction (systole) is called systolic pressure. Its normal value is 120 mm Hg. The pressure the arteries ventricular relaxation (diastole) is called diastolic pressure. Its normal value is 80 mm Hg. Blood pressure is affected cardiac output, blood volume, peripheral resistance and viscosity of the blood. It is most commonly measured the brachial artery.

PART FIVE

increases • decreases (2) • regulates • depends • affected • regulated • varies

The velocity of blood flow is the slowest in the capillaries as it as the total cross sectional area of blood vessels That is why the severity of blood loss due to injury to different blood vessels, being less severe when capillaries are Blood flow also due to the resistance of the blood vessels. The vasoconstriction and vasodilation of the latter is by the autonomic nervous system which thus blood flow. Blood flow is generally faster in arteries than in veins where it largely on skeletal muscle action, respiratory movements and contraction of smooth muscle in venous walls.

PART SIX

convey • triggers • increase • detected • regulated • secreted • equipped • detect • deviate • reduce • signalling • makes • secrete • stimulates • increases

The cardiovascular system is with a number of regulatory mechanisms. When blood pressure and vessel walls stretch, baroreceptors located in the aortic arch and carotid sinus it and the information back to the heart and blood vessels so that they will it. When carbon dioxide, hydrogen ions or oxygen concentration from normal levels, they are by chemoreceptors. Blood volume and hence blood pressure is also by the antidiuretic hormone by the posterior pituitary in response to a neural impulse, among others, increased osmotic pressure of water, its volume depletion, hypoglycemia. Decrease in blood pressure a chain reaction which the kidneys secrete rennin which in turn the production of angiotensin causing vasoconstriction and release of aldosterone, both of which blood pressure.

Task 4

Mark the following statements T (true) or F (false). Justify your answer in the context of the texts above and your general knowledge.

1. Blood flow is absolutely necessary to the functioning of the human body.
2. Permeability of capillary walls allows for the diffusion of fluids into and out of cells.
3. The heart pumps approximately 150 000 litres of blood a week.
4. The heart muscle is independent of our will and of the nervous system.
5. The sinoatrial node is situated in the left atrium.
6. The sinoatrial node is responsible for the relaxation of the heart muscle.
7. Disturbances in the pumping action of the heart are of no or minor consequences for the body functions.
8. The heart muscle is similar to other muscles in at least one way.
9. The nutrients are supplied to the heart muscle by the pulmonary arteries.
10. Angina pectoris is caused by failure in blood supply to some part of the heart muscle.
11. The heart muscle cannot function without regular supply of nutrients.
12. Changes to the heart muscle are reversible.
13. Insufficient blood supply to the heart muscle has numerous adverse consequences.
14. BP is the same throughout the cardiovascular system at all times.

15. Diastolic pressure is the pressure on ventricular contraction.
16. There are several determinants of the level of blood pressure.
17. Blood flows most slowly in veins.
18. Resistance of blood vessels increases blood flow.
19. The autonomic nervous system controls blood flow.
20. Blood flow in veins depends on three factors.
21. The regulatory mechanisms of the cardiovascular system include a number of receptors.
22. Hormones have no effect on the cardiovascular system.

Task 5

Answer the following questions concerning the cardiovascular system physiology.

1. What are the roles of oxygen and carbon dioxide in the body and how is each of them carried in the blood?
2. What vital components are carried by the blood flow?
3. How do oxygen, carbon dioxide, glucose and water move across capillary walls? By what transport mechanism do oxygen and carbon dioxide move across the capillary wall?
4. What factors affect blood flow through blood vessels?
5. What two pressures determine fluid movement across the capillary wall?
6. What makes all cardiac muscle fibres contract in a coordinated way?
7. Which structure in the heart sets the rate at which cardiac muscle contracts?
8. What is the natural pacemaker of the heart called and where is its location?
9. What may happen to a person in case of insufficient oxygen supply to any vital organ of the body?

10. What happens if the blood supply to a part of the body is blocked?
11. What happens if someone has a heart attack?
12. What does the heart muscle need to function properly?
13. How does the myocardium receive oxygen that is required for contraction?
14. What is meant by the medical terms systole and diastole?
15. What factors affect blood pressure?
16. When does systolic pressure occur and what is its normal value?
17. What methods of taking blood pressure do you know?
18. How would you define pulse pressure?
19. By what regulatory mechanisms do hormones cause an increase in the blood pressure?
20. How does the cardiovascular system work together with the nervous system?

Task 6

Prepare 'examination' questions referring to the information provided and check each other's knowledge.

D. Vocabulary Practice

Study the cardiovascular system emergencies related vocabulary.

Task 7

Complete the text with the vocabulary given below.

PART ONE

preventing • ruptured • impairs • affects • restoring • functioning (2)
• are • begin

Vocabulary

ruptured vessel zerwane,
pęknięte naczynie
epistaxis krwawienie z nosa
haemorrhage krwotok
shock wstrząs
dysrhythmia niemiarywość
syncope omdlenie
cardiac arrest zatrzymanie akcji
serca
ischaemic heart disease choroba
niedokrwienne serca
haemodynamic compromise
niewydolność hemodynamiczna

diaphoresis obfite pocenie się
impairment zaburzenie czynności

The proper of the cardiovascular system is as vital for the life and health of the human being as the proper of the respiratory system. Moreover, any injury or illness that one of the systems also the workings of the other as the two systems responsible for the supply of oxygen to the cells and tissues of the body. A few minutes break in the supply of oxygen to cells of the vital organs, such as the brain, and the cells to die. That is why respiration is always crucial as is also further blood loss from a vessel or organ whether external or internal.

PART TWO

circulation (2) • transfusion • composition • loss • ability • compatibility • capacity • type (2) • presence • emergencies • supply

The of the cardiovascular system to deliver oxygen to the body is conditioned not only by the of the respiratory system but also by the of an adequate amount of blood in and the proper of the blood. Heavy bleeding (**haemorrhage**) which often accompanies accidents and may lead to such a severe of blood that the blood left in will not be capable of ensuring an adequate oxygen Should this be the case, blood may be necessary. When emergency transfusion is to be performed and not enough time is available for thorough blood testing, type O RBCs are transfused if the ABO is uncertain and Rh-negative blood is given when the Rh is uncertain.

PART THREE

bleeding (3) • pressure • supply • condition • disease • life • capillaries • possibility • injuries • course

Arterial is particularly dangerous because arterial blood is under and thus an arterial haemorrhage may deplete oxygenated blood within minutes leading to a called **shock** the signs of which include tachycardia, tachypnoea, hypotension, pallor, diaphoresis, confusion. Angina or myocardial infarction (MI) may also develop in patients with an underlying isch(a)emic heart Therefore, it is essential to stop or control The same applies to venous which is generally slower but can still be-threatening if it is allowed to continue. Bleeding from usually stops by itself. What should always be kept in mind is a of internal bleeding, not necessarily and not exclusively due to internal sustained in the of an accident.

PART FOUR

ability • condition • intervention • formation • failure • discomfort • arteries • resuscitation • beat • compromise • problem • impairments

..... to oxygenate tissues may also result from a blood clot (thrombus) in the system or internal bleeding. A of this kind involving the brain is called a **stroke** and may lead to mental and physical If it is cardiac that get blocked, the heart muscle or its part may die which is referred to as **myocardial infarction**. The of the heart to propel blood may also be disturbed by an abnormal heart, **dysrhythmia** or **arrhythmia**. The symptoms of the resultant haemodynamic include dyspnoea, chest, presyncope, syncope. The heart may also stop. This called **cardiac arrest** can cause death within a few minutes and requires an immediate, called cardiopulmonary (CPR).

Task 8

Read the passages again and decide if the following statements are true. Justify your opinion and correct the false sentences.

1. There is a relation of mutual dependence between the cardiovascular system and another system.
2. Restoration of respiration is vital to the proper functioning of the cardiovascular system.
3. The ability of the cardiovascular system to deliver oxygen to tissues is conditioned by a number of factors.
4. Any blood loss requires blood transfusion.
5. In an emergency situation any patient can be given any blood type.
6. Arterial haemorrhage is most life-threatening.
7. Shock is condition difficult to diagnose.
8. The presence of an ischemic heart disease makes any haemorrhage more dangerous for the victim's life.
9. Not all bleedings require medical intervention.
10. To be life-threatening bleeding need not be visible to the eye.
11. A stroke may be an indirect or consequence of internal bleeding.
12. Myocardial infarction equals death of the heart.
13. Abnormal heart rhythm or arrhythmia is something normal to the heart.
14. Cardiac arrest means immediate death of the heart.

Task 9

Prepare 'examination' questions referring to the information provided and check each other's knowledge.

E. Vocabulary in Action

Practice the vocabulary studied above.

Task 10

1. 'I was running to catch a bus when the pain hit me.'

The patient reports experiencing a sudden pain when running to catch a bus.

2. 'I felt a crushing pain in my chest.'

3. 'The pain gripped me and suddenly I couldn't breathe.'

4. 'I was sort of restless and anxious all day.'

5. 'I felt all sweaty and uncomfortable before I felt that pain in my chest.'

6. 'The pain sort of spread to my left arm and jaw.'

7. 'I felt as if my heart was thumping.'

8. 'I feel sweaty all over my body. I perspire profusely; my skin is cold and clammy.'

9. 'I can hardly feel my pulse and I keep yawning all the time.'

10. 'I woke up in the middle of the night gasping for air.'

11. 'I was trying to open my bowels this morning and suddenly became very dizzy and nauseous.'
-

Task 11

Choose the right medical term to describe the patient's condition and then report the patient's condition.

orthopnoea • dyspnoea • syncope • perspiration • pre-syncope • anxiety • ankle oedema • severe dyspnoea • epistaxis • cardiac arrhythmia

1. 'I can't catch my breath.' *dyspnoea*

The patient complains of *dyspnoea*.

2. 'I am all sweaty.'
-

3. 'I'm all nerves and worried for no good reason.'
-

4. 'I often have a feeling that the world is spinning around me but it lasts just a moment.'
-

5. 'I can't catch my breath at night unless I sleep on a few pillows.'
-

6. 'I feel terribly short of breath.'
-

7. 'My ankles are swollen.'
-

8. 'I sort of fainted yesterday but I didn't give it a thought as it was very hot.'
-

9. 'Blood is dripping from my right nostril and I can't stop it.'
-

10. 'I've got this strange sensation as if my heart has skipped a beat.'
-

Task 12

Choose the right medical term to describe the patient's condition and then report on the patient's condition.

retrosternal pain • pre-syncope • vertigo • nausea • cyanosis • vomiting • dyspnoea • fatigue • palpitations • dyspnoea on exertion

1. 'For the past two hours this chest pain has been getting worse.'
- thoracic pain*

There is a **history** of worsening thoracic pain of two hours' duration.

2. 'I've had more and more difficulties with catching my breath for a few days now.'
-

3. 'Sometimes my fingernails get sort of cold and bluish.'
-

4. 'I've been sick for the past few hours but I haven't thrown up.'
-

5. 'I've often felt sort of dizzy over the past few weeks.'
-

6. 'I've felt increasingly tired and weak over the past few days.'
-

11. 'I was trying to open my bowels this morning and suddenly became very dizzy and nauseous.'
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7. 'I've felt this sort of discomfort or pain behind my breast bone for the past few hours.'

8. 'I tend to feel sort of weak all of a sudden and seem to lose contact with what's going on.'

9. 'I started to experience an impending feeling as if my heart was racing.'

10. 'I feel even more short of breath after climbing stairs.'

Task 13

Look at the example in 1. First, ask the right question and then report the elicited information.

1. *Can you show me where you feel the pain?*

'It's right here, as if under the breast bone and also in my left arm.'

The patient complains of substernal pain radiating to the left arm.
or

The patient reports ... / There is ...

2. 'It came all of a sudden. I was just walking in the garden. It was perhaps an hour ago.'

3. 'It's sort of burning and crushing. I've never had a pain so bad in my chest.'

4. 'No, I didn't. I was conscious of what was going on. I just collapsed.'

5. 'I woke up an hour ago. The pain in the chest must have woken me. I couldn't breathe and my heart was beating like mad.'

6. 'I felt that something bad was about to happen but the pain hit me without any warning.'

7. 'No. My heart has never given me any problems, not even when I was working hard.'

8. 'Yes. I just feel sort of strange, weak, almost dizzy. In fact it has happened more frequently recently. I just sit down for a few minutes and try to breathe in deeply.'

9. 'I'm struggling to catch my breath when I lie down in bed at night.'

10. 'Yes. I take my BP regularly at home and it is always higher than normal.'

Task 14

Complete the sentences with the English equivalents of the Polish words given in brackets.

1. The patient is but breathing. (bez kontaktu)
2. There is a history of and (duszności, przyspieszone bicie serca)
3. The patient reports having earlier in the day. (ból zmostkowe)
4. There were frequent episodes of and over the past few weeks. (zawroty głowy, stan przedmldeniowy)
5. The patient complains of severe and (duszności, uczucie dyskomfortu w klatce piersiowej)
6. There are evident and (bładość; przyspieszone oddychanie, dezorientacja)
7. The victim complains of (ból klatki piersiowej promieniujący do lewego ramienia)
8. There is a history of and (obrzęk kostek u nogi, utrudnione oddychanie w pozycji leżącej)
9. A fretful child presents to the ambulance station with (krwawienie z nosa). There was no evident (objawy urazu nosa)
10. There is a recent history of (nadciśnienie, choroba serca, słabe ukrwienie)

F. Listening Practice & Dialogue Completion

Task 15



Listen and complete the dialogue between the caller (C) and the dispatcher (D).

C: I'm calling about my neighbour. He says he has a and his heart is sort of I'm afraid it may be a heart attack.

D: How old is your neighbour?

C: I don't know exactly.

D: Has he ever had any problems? Is he on any cardiac or other?

C: He's to me of his weak heart and I know he has problems with and I know he's taking to control it.

D: How does he describe the pain?

C: He says it's sort of and and he feels it also in his Anything I can do before you arrive?

D: Just stay with him. Tell him to slowly and

Task 16

Recap the information for the ambulance crew to be sent to the site of the emergency.

Task 17



Listen and complete the dialogue between the ambulance crew (AC) and the family member (FM).

AC: Good morning. My name's John. Where's our patient?

FM: Follow me, please. She's here in kitchen. I couldn't
her from the

AC: Did she suddenly?

FM: Not really. She of feeling her heart
flutter like a bird all the and of having
a But then she always complains so I didn't
take it seriously.

AC: So you called the emergency only after she collapsed.

FM: No, no! It was when I saw her become and sort
of She must have when I was on the
phone to you.

AC: Why didn't you tell her to sit and relax? You could have
called her GP.

FM: She wouldn't listen. She never does. Besides she was extremely
.....

Task 18

Recap the information to notify the A&E Department of the
patient who is about to arrive.

Task 19

Complete the dialogue between the caller (C) and the dispatcher
(D) with the words or phrases from the list.

with you • getting • how old • breathing • describe • feel

C: My name's Gordon Brown. I'm calling from 46 South Road.
My heart's giving me problems and I'm alone at home.

D: Can you to me how you

C: I can feel the heartbeat, beat somewhat harder and more
irregularly. And there's this pressure on my chest.

D: What about

C: I feel as I needed more air then I can draw in. I feel sort of
weak and at times the room seems to be spinning.

D: are you, Mr. Brown?

C: 64.

D: We'll be in ten minutes. I understand we'll have no
problems with into the house.

Task 20

Mark the statements true (T) or false (F). Correct the false
statements.

1. The call is from the patient himself.
2. The patient is calling from 36, North Road.
3. The patient has palpitations.
4. The patient has no chest related complaints.
5. The patient's respiration is impaired.
6. The patient is under 60 years of age.

Task 21

Recap the information to the ambulance crew to be sent to the site
of the accident.

Task 22

Complete the dialogue between the caller (C) and the dispatcher
(D).

C: Emergency? My name's Cassidy. I'm in Green Lane with
a woman who seems to be having a cardiac problem.

D: the symptoms?

C: She's short of breath, very pale and sort of limp. She seemed
about to faint so I helped her to a bench. She can't sit straight
on her own.

D: is she?

C: 45-50 I'd say.

D: her how she feels?

C: Actually I did but I got no response. She is just moaning and fighting for air.

D: Anybody to you? Are you familiar with

C: No. Not at all. And there's nobody in sight. Can you send an ambulance, please? She seems to be losing it.

D: The ambulance is on They will be in about 8 minutes.

Task 23

Mark the statements true (T) or false (F). Correct the false ones.

1. The victim is a man.
2. The victim is on a bus.
3. The victim is tachypnoeic.
4. The victim was about to faint.
5. The caller cannot communicate with the victim.
6. Catching air seems to be the victim's major problem.
7. The caller has begun to give first aid to the victim.
8. The ambulance will reach the site of the accident within 5 minutes.

Recap the information to the ambulance crew to be sent to the site of the accident.

G. Follow-up

Task 24

Prepare a mini-presentation on the disorders and emergencies involving the cardiovascular system. Say what information the dispatcher and the ambulance crew should collect from the victim or witnesses, what they should give particular attention to.

Task 25

Prepare a list of questions that the patient or the patient's relative or the caller/witness should be asked.

Task 26

Simulate similar situations involving receiving information about an emergency and passing it on to the ambulance crew.