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Diploma in Pharmacy 1st Year
Human Anatomy and Physiology
Important Questions
Chapter 7 : Cardiovascular System

Questions	Page No
Q1. Describe the Cardiovascular System.	3
Q2. Draw the Diagram of Heart and Label it.	3
Q3. What are the different types of Blood Vessels present in the body. Describe the anatomy of the blood vessels.	5
Q4. Describe the various Blood Circulation Methods Through the heart.	5
Q5. Write the note on Blood Pressure and its Regulation.	6

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Chapter 7
Cardiovascular System
IMPORTANT Questions

Q1. Describe the Cardiovascular System.

Ans.

Cardiovascular System

- The system that fulfils the transportation needs of the body is cardiovascular system.
- This system is composed of the heart, blood vessels, and blood.

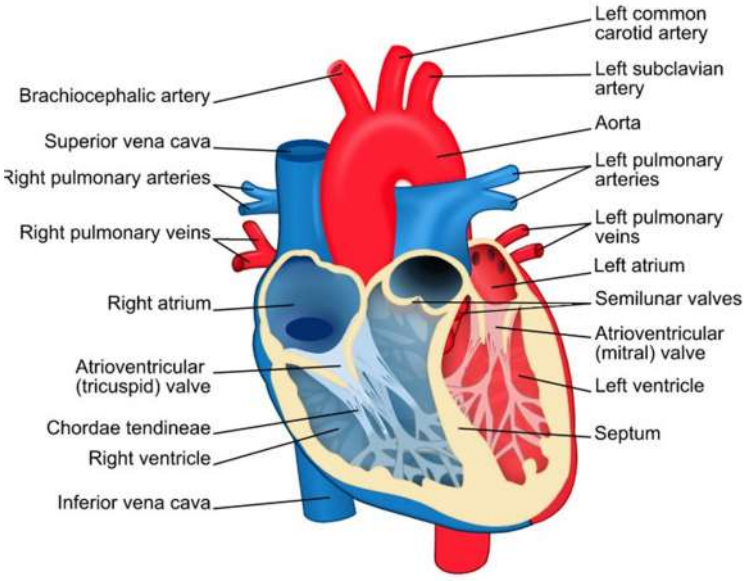
Main functions of the cardiovascular system are:

1) Distribution of 02 and nutrients to all Jhe body cells and tissues.
2) Transportation of CO_2 and metabolic waste products from tissues to lungs and other excretory organs.
3) Distribution of water, electrolytes, and hormones throughout the body.
4) Thermoregulation.

- Blood is pumped by the heart (a muscular organ of the circulatory system).
- Heart consists of very strong cardiac muscle tissue and shows rhythmic contraction and relaxation
- As a result of this contraction and relaxation, a force Is generated that pumps the blood to the entire body along With nutrients and oxygen.
- Heart is a muscular organ, present in all vertebrates that pump blood to the whole body continuously.
- In humans, its size is equal to the size of a clenched fist, and average weight for females is 250-300gm, and 300-350gm for males.
- Average human heart beats around 70-72 times per minute.

Q2. Draw the Diagram of Heart and Label it.

Ans.



Anatomy of Heart

- Heart is situated in the thoracic cavity, obliquely between the lungs in the mediastinum space, just above the diaphragm.
- Heart is present in the midline of the body, is slightly tilted towards the left.
- It is a rounded cone shaped structure
- Heart is enclosed by a serous membrane known as pericardial sac or partial pericardium.

The pericardial sac consists of two membranes:

1) Fibrous Pericardium: This pericardium covers the heart joining it to great vessels (vena cava, aorta, pulmonary vein, and artery).
2) Serous Pericardium: This pericardium is a thin, delicate membrant. The outermost layer of the heart wall (known as epicardium) and large blood vessels are continuous with this membrane.

Heart Wall

The wall of the heart is composed of three layers:

- Epicardium or Visceral Pericardium: This is the visceral layer of partial pericardium and forms the outer most layer of heart.This is a transparent, thin layer and consists of specialised epithelial tissues known as mesothelium.Pericardial cavity is a space between the epicardial membrane of heart and the serous pericardium of pericardial sac.Fluid present in this cavity is known as pericardial fluid and it protects the heart from friction and erosion
- Myocardium: It is the thickest layer and consists of cardiac muscle tissue. Fibres of cardiac muscle tissue are striated, involuntary, and branched. Heart contracts by the contraction of the myocardial membrane
- Endocardium: It is the innermost and third layer of the heart wall. It consists of a thin layer of specialised epithelial tissues (known as endothelium) which overlies a thin layer of connective tissue. This Layer provide Smooth blood flow to heart and vessles. Endothelium also lines inner cavities of the heart , covers valves, and forms the inner lining of blood vessels

Chambers of heart

The heart is composed of muscular walls and has four distinct chamber of different thickness. The left Atrium (LA) and Right Atrium (RA) situated above the Left Ventricle (LV) and Right Ventricle (RV), Respectively, Ventricles are thick-walled, large chamber performing many function

Valve of Heart

Heart pump blood to the lungs and other body system A system of on way Valves is present in the heart that prevent the backflow of blood into the heart valves can be categorized into two types

- Atrioventricular (AV) Valves: These valves are present in the middle of the heart between the atria and ventricles, and only allow blood to flow from the atria into the ventricles
- The AV valve located on the right side of the heart is known as the tricuspid valve.
- The AV valve on the left side of the heart is known as mitral valve or the bicuspid valve
- Semilunar Valves: These are crescent moon-shaped valves, located between the ventricle and the arteries, and carrying blood away from the heart towards the other body parts
- The semilunar valve present in the right chamber of heart is known as pulmonary valve
- The semilunar valve present in the left chamber of the heart is known as aortic valve

Q3. What are the different types of Blood Vessels present in the body. Describe the anatomy of the blood vessels.

Ans. **Blood Vessels**

- The cardiovascular system is responsible for pumping of blood throughout the body and thus transport oxygen, nutrients and hormones to different body organs and tissues and carrymg away wastes Therefore the cardiovascular system maintains homeostasis of all other systems in the body blood vessels (the main part cardiovascular system) form a closed circuit of tubules for carrying blood away from the heart to different tissues and then bringing it back to the heart
- Blood vessels from the left ventricle supplying different tissues in the body are Ix IO^5 km long.
- The blood vessels comprise the major Pat of the circulatory system and maintain blood circulation in the body

Types

various kinds of blood vessels are discussed below in series:

Arteries: These are elastic vessels, carrying blood from the heart (under high pressure) to different tissues and organs. For example,

(i) Aorta the largest artery, carries blood out of the heart, and

(ii) Branches of the aorta, the carotid artery, the subclavian artery, the celiac trunk, the mesenteric arteries, the renal artery, and the iliac artery.

- Arterioles: They are the sub-divisions of arteries. They are thinner than the arteries
- Capillaries: These blood vessels have smallest diameter. They connect the arterioles (smallest diameter arteries) to the venules (smallest diameter veins)
- Venules: These are veins having the smallest diameter. They connect the capillaries to the larger veins
- Veins: These blood vessels carry blood from different organs and tissues, back to the heart (atria)
- For example : Large collecting vessels, such as the subclavian vein, the jugular vein, the renal vein and the iliac vein, and
- Vena cava (2 large veins, carry blood into the heart)

Q4. Describe the various Blood Circulation Methods Through the heart.

Ans.

Circulation of Blood through the Heart

- With every heart beat the blood is pumped into two closed circuits, i.e., the pulmonary and the systemic circulation.

The following four routes of blood circulation through heart have been discussed below:

1) Systemic circulation
2) Pulmonary circulation
3) Portal circulation
4) Coronary Circulation)

Systematic Circulation

Left side of the heart participates in systematic circulation and receives oxygenated blood from the lungs From the left ventricle blood is pumped into the aorta and the backflow is guarded by the aortic valve

Pulmonary circulation

- The right side of the heart is involved in the pulmonary circulations. It receives deoxygenated blood returning from the systemic circulation and pumped to the lungs.
- The deoxygenated blood enters the right ventricle from the right atrium and the backflow is checked by the tricuspid valve. From the right ventricle blood is pumped into the pulmonary trunk and then, into the pulmonary arteries and the backflow is checked by the pulmonary valve. The pulmonary circulation carries deoxygenated blood to the lungs.
- The gaseous exchange takes place at the surface of alveoli and the blood gets oxygenated (i.e., loses carbon dioxide) in the pulmonary capillaries.
- The oxygen-rich blood is then carried via pulmonary veins, to the left atrium from where it is distributed to the rest of the body systems

Portal Circulation

Blood enters the liver from two sources.

→ The hepatic artery supplies oxygenated blood from the abdominal aorta and the hepatic portal vein carries deoxygenated blood from the digestive organs.

→ The flow of deoxygenated blood from the digestive organs to the liver before returning to the heart is called hepatic portal circulation.

→ A vein which does not carry blood directly to the heart but forms networks of capillaries in another or intermediate organ before reaching the heart is called a portal vein.

→ A portal vein together with small veins through which it receives blood is called the portal system.

Q5. Write the note on Blood Pressure and its Regulation.

Ans. Blood Pressure and its Regulation

Blood pressure is the hydraulic pressure exerted by the blood on the blood vessels

Normal blood pressure has high systolic value and low diastole value 120mmHg/ 80mm Hg in arteries.

Arterial blood re be of four types:

1) Systolic Pressure: It is the maximum L pressure or peak pressure (120mmHg in a healthy adult) exerted in the arteries during the systole of the heart.It occurs at the beginning of the cardiac cycle when the left ventricle contracts and pumps blood to the aorta.
2) Diastolic Pressure: It is the minimum pressure (80mmHg in a healthy adult) on the arteries It occurs at the end of the cardiac cycle when the ventricles are in resting phase after pumping the blood.

3) Pulse Pressure: It is the differential pressure of systolic and diastolic pressur It is about 4QmmHg in a healthy adult.)
4) Mean Arterial Pressure : It is the average pressure on the arteries.

Stethoscope:

- The word stethoscope consists of two words Steth means chest and Scope means to inspect.
- The stethoscope in Its present from was introduced in 1819, by Laennec, whereas, Chat Korotkoff, in 1905 used it first time for recording the blood pressure.
- It is used to hear the sounds produced in the chest and elsewhere in the body.
- The stethoscope has the following three parts:
    I. Chest-Piece
    II. Rubber Tubing
    III. Ear Frame

Sphygmomanometer

- This instrument is commonly known as the BP apparatus and is used to record arterial blood pressure in humans.
- The word sphygmomanometer is derived from three Greek roots with Latin equivalents sphygmo means pulse, manos means thin, and metron means to measure.
- Nowadays various forms of BP instruments are used, but the most common one is the mercury sphygmomanometer which consists of the following parts:
    a) Mercury Manometer
    b) Air Pump (Rubber Bulb)
    c) Gradulated Tube
    d) Armlet (Rubber bag / Riva Rocci Cuff)

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