TENDER HEART HIGH SCHOOL, SEC-33B, CHD.

Class - 9 Date. - 09.12.2024

Subject - Biology Teacher - Nidhi Rana

Good morning Students,

This lesson is of Class 9 for the subject of Biology Topic - Blood vessels covered in chapter - 8 titled Circulatory system starting on Page No 90 of your text book titled 'Concise Biology - Selina Publications' and is being submitted to you on 09.12.2024

Students please open page No 103 of your textbook as we will discuss the various types of blood vessels now. There are three types of blood vessels - arteries veins and capillaries which are all connected to form a continuous system. Infact, blood vessels are branched tubes extending from heart to all parts of the body let us now discuss the three types of blood vessels one by one -

i Artery is a fairly wide vessel that carry blood from heart to different organs of the body.

- Arteries have thick, elastic and muscular wall
- Arteries have a narrow lumen i.e. the central bore or cavity.
- Blood flows in spurts in arteries i.e. blood comes out suddenly and quickly with great force which correspond to the ventricular contractions of the heart

ii Vein is a blood vessel which carries the blood away from an organ towards the heart.

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- Veins have thin, less muscular wall and wide lumen
- Blood flows uniformly in veins because veins
- are carrying the blood coming from the body organs to heart, hence blood pressure in them is steady
- Veins contain thin pocket shaped valves whose openings face in the direction of the heart. These valves prevent the backflow of the blood. As the blood pressure in the veins is less than the pressure in the arteries, so it tends to return Thus the valves prevent the back flow of blood which permits unidirectional flow of blood. Children you may please see fig 8.11 showing the valves in a vein The arrows depict the flow of blood. which is in the direction of the heart Thus in Fig 8.11 because the blood is flowing in upward direction (as depicted by the arrows), hence it is concluded that as per the given diagram the heart is in upward/upper position Children also see the Fig 8.10 showing the diagram of an artery and a vein. Arteries and veins have the following layers -

(i) Tunica externa - External layer made up of connective tissues
(ii) Tunica media - middle layer made up of smooth muscle and elastic fibres.
(iii) Tunica interna - inner most endothelium layer.
(iv) Lumen - is the central cavity of blood vessels.

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Also you may see in Fig 8.10 that the lumen of a vein is wider than the lumen of an artery
Now let us talk about capillaries which are very narrow tubes about 8 micrometers in diameter.
Capillaries - Walls of capillaries consist of single layer of squamous epithelial cells called the endothelium Capillaries do not have muscles and these lie in contact with body tissues.
functions - 1. Capillaries help in outward diffusion of oxygen into intercellular fluid and from there into the tissue cells (for respiration)
2 CO_2 from cells diffuse into intercellular fluid Then the CO_2 from the intercellular fluid diffuse into the capillaries easily because of the thin walls of capillaries which help in easy diffusion
3 Similarly capillaries allow inward and outward diffusion of many other substances like - glucose amino acids, urea, hormones etc.
4. Leucocytes squeeze out of the thin walls of capillaries by the process of diapedesis
5 Vasodilation and vasoconstriction occuring in blood capillaries help in maintaining normal body temperature and body heat during summers and winters.
6. Capillaries establish continuity between arteries and veins which is explained as follows - Artery divides into smaller branches. The

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smallest or the final branch of an artery is called an arteriole Arterioles are highly muscular and can change their diameter manifold These arterioles break up into capillaries Capillaries gradually reunite and increase in size assuming the same three layers (outer - connective tissue layer middle - muscular layer and inner - endothelium) to form a venule. The venules join to form larger veins

It is the break time now. Listen to the following questions

Q1 Name the blood vessel that takes blood from heart to the organs

Q2. Name the blood vessel where actual exchange of substances occur.

Q3 The smallest or final branch of an artery is called ——. Fill in this blank.

Children you may now pause the audio for 3 mins now and write the answers to these questions Break is over children. Listen to the correct answers

A1 Artery takes blood from heart to the organs

A2 Exchange of substances occur in the capillaries.

A3 The smallest branch of an artery is arteriole.

Let us now discuss the differences between an artery and a vein. which are as follows -

1. Arteries distribute blood from heart to different parts of the body whereas veins collect blood from different parts of body and

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pour it into the heart
2. Arteries divide and further divide to form arterioles, thus decreasing insize and finally form the capillaries. Capillaries progressively reunite to form venule which further join to form veins, thus increasing in size
3. Arteries have thick muscular walls to withstand the pressure of the blood being pumped by the heart where as veins have thin and less muscular walls as the blood flows under low pressure in the veins
4. Arteries have elastic walls veins have non elastic walls
5 Arteries have narrow lumen whereas veins have wider lumen
6 Arteries do not have valves whereas veins have valves which prevent back flow of blood. Arteries receive blood, from heart, being pumped at a high pressure, thus they donot require valves.
7 Being elastic in nature the walls of arteries can constrict or dilate to control blood flow In veins blood flow is smooth as the walls of veins are non elastic
8 Arteries are deep seated or placed deeper in the tissues as they are carrying blood i.e. oxygenated blood flowing at a high pressure in them Thus in case of any injury

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there will be huge loss of blood To prevent great loss of oxygenated blood the arteries are deep seated Veins are carrying deoxygenated blood flowing under low pressure, thus veins are superficial or present nearer to skin surface

9. Because the walls of arteries are highly muscular and thick so they do not collapse even when empty. whereas veins collapse when empty because their walls are thin and less muscular

10 Blood flows with jerks and under great pressure in arteries because arteries receive the blood being pumped by the heart. whereas in veins flow of blood is smooth and under low pressure.

11. Except pulmonary artery all arteries carry oxygenated blood whereas all veins carry deoxygenated blood except pulmonary vein

Now children let us talk about the two blood circulations occuring in the human body for which it is also called the

Double circulation - Blood flows twice in the heart before it completes one full round thus forming 2 circulations as given below -

(i) Pulmonary circulation pertains to lungs. It starts from right ventricle. Blood from right ventricle enters into pulmonary artery and then from pulmonary arteries to lungs

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From lungs the oxygenated blood enters the pulmonary veins and is poured back into the left auricle of the heart.

ii Systemic circulation pertains to the major circulation in the body. It starts from left ventricle Blood from left ventricle enters into aorta. The aorta sends oxygenated blood through arteries to various body parts and their tissues. From there the blood is collected by veins and poured back into the right auricle.
Thus these two circulations - i.e. pulmonary and systemic circulations form the 2 components of double circulation.
This finishes with todays discussion. Now I will give you some home assignment questions which you all have to do in your notebooks -
Home assignment questions are as follows -

Q1. Do the following review questions given at the end of the chapter in your notebooks -
D Descriptive type
Q No 5
E Structured / Application Type
Q No 3 ; Q No 6.

Q2 Draw well labelled diagram of an artery and a vein.