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Department: Radiology 2nd

Assignments: human physiology

Section: A

Q1:what is blood? Explain composition and function of blood.

Ans: Blood: Blood is a body fluid in humans and other animals that delivers necessary substances such as nutrients and oxygen to the cells and transports metabolic waste products away from those same cells.

Composition of blood: Blood is a specialized body fluid. It has four main components: plasma, red blood cells, white blood cells, and platelets. Blood has many different functions, including: transporting oxygen and nutrients to the lungs and tissues.

Plasma: The liquid component of blood is called plasma, a mixture of water, sugar, fat, protein, and salts. The main job of the plasma is to transport blood cells throughout your body along with nutrients, waste products, antibodies, clotting proteins, chemical messengers such as hormones, and proteins that help maintain the body's fluid balance

Red blood cell: Known for their bright red color, red cells are the most abundant cell in the blood, accounting for about 40 to 45 percent of its volume. The shape of a red blood cell is a biconcave Red cells contain a special protein called hemoglobin, which helps carry oxygen from the lungs to the rest of the body and then returns carbon dioxide from the body to the lungs so it can be exhaled. Blood appears red because of the large number of red blood cells, which get their color from the hemoglobin. The percentage of whole blood volume that is made up of red blood cells is called the hematocrit and is a common measure of red blood cell levels.

White blood cell; White blood cells protect the body from infection. They are much fewer in number than red blood cells, accounting for about 1 percent of your blood.the most common type of white blood cell is the neutrophil, which is the "immediate response" cell and accounts for 55 to 70 percent of the total white blood cell count.

Each neutrophil lives less than a day, so your bone marrow must constantly make new neutrophils to maintain protection against infection. Transfusion of neutrophils is generally not effective since they do not remain in the body for very long.The other major type of white blood cell is a lymphocyte. There are two main populations of these cells. T lymphocytes help regulate the function of other immune cells and directly attack various infected cells and tumors. B lymphocytes make antibodies, which are proteins that specifically target bacteria, viruses, and other foreign materials.

Platelets: A higher than normal number of platelets can cause unnecessary clotting, which can lead to strokes and heart attacks; however, thanks to advances made in antiplatelet therapies, there are treatments available to help prevent these potentially fatal events. Conversely, lower than normal counts can lead to extensive bleeding.

Functions of blood: Blood performs many important functions within the body, including:

- Supply of oxygen to tissues (bound to hemoglobin, which is carried in red cells)
- Supply of nutrients such as glucose, amino acids, and fatty acids (dissolved in the blood or bound to plasma proteins (e.g., blood lipids))
- Removal of waste such as carbon dioxide, urea, and lactic acid
- Immunological functions, including circulation of white blood cells, and detection of foreign material by antibodies
- Coagulation, the response to a broken blood vessel, the conversion of blood from a liquid to a semisolid gel to stop bleeding
- Messenger functions, including the transport of hormones and the signaling of tissue damage
- Regulation of core body temperature

Q2:Explain physiology of cardiovascular system?

Ans: The cardiovascular system provides blood supply throughout the body. By responding to various stimuli, it can control the velocity and amount of blood carried through the vessels. The cardiovascular system consists of the heart, arteries, veins, and capillaries.

Organ system involved: The heart is the organ that pumps the blood through the vessels. It pumps blood directly into arteries, more specifically the aorta or the pulmonary artery. Blood vessels are critical because they control the amount of blood flow to specific parts of the body. Blood vessels include arteries, capillaries, and veins. Arteries carry blood away from the heart and can divide into large and small arteries. Large arteries receive the highest pressure of blood flow and are more thick and elastic to accommodate the high pressures. Smaller arteries, such as arterioles, have more smooth muscle which contracts or relaxes to regulate blood flow to specific portions of the body. Arterioles face a smaller blood pressure, meaning they don't need to be as elastic. Arterioles account for most of the resistance in the pulmonary circulation because they are more rigid than larger arteries. Furthermore, the capillaries branch off of arterioles and are a single cell layer. This thin layer allows for the exchange of nutrients, gases, and waste with tissues and organs. Also, the veins transport blood back to the heart. They contain valves to prevent the backflow of blood.

The cardiovascular system transports materials throughout the body:

1. Materials entering the body, such as oxygen via the lungs and nutrients and water via the intestinal tract, are carried to all cells.
2. Materials moved from cell to cell (intercellular communication) including:
a) wastes products from some cell cells to the liver for processing;
b) immune cells that are present in the blood continuously for other cells,
c) hormones from endocrine cells to their target cells
d) stored nutrients from liver and adipose tissue to all cells.
3. Materials that are expelled from the body, such as metabolic wastes, heat, and carbon dioxide that are removed via the kidneys, skin, and lungs, respectively.

As a general overview, the cardiovascular system is composed of the heart, the blood vessels (or vasculature), and the cells and plasma of the blood.
1. Arteries are blood vessels that carry blood away from the heart and veins return the blood to the heart. A system of valves in the heart and veins ensures that the blood flows in one direction.
2. The heart is anatomically divided into two halves by a central wall, or septum, into left and right halves. Each half is composed of an atrium which receives blood returning to the heart and a ventricle that pumps the blood out into the blood vessels that serve the body. The atria and ventricles and exiting blood vessels are separated by closable valves. Functionally, the heart serves as a pump in series that generates pressure to propel the blood through the system.
3. The lungs are were oxygen is picked up and carbon dioxide is expelled. The pulmonary circulation goes from the right side of the heart (deoxygenated blood) and returns it to the left

side of the heart, with oxygenated blood.
4. The systemic circulation consists of the vessels that go from the left side of the heart to the tissues and back to the right side of the heart.

The systemic circulation and the pulmonary circulation can be traced together:
Deoxygenated blood returning from body enters the heart in the right atrium. From the right atrium the blood passes through the tricuspid valves to enter the right ventricle. The blood is then pumped into the pulmonary arteries, passing the pulmonic valves, where it goes to the lungs. After becoming oxygenated in the lung's capillaries, the blood is carried by the pulmonary veins to the left atrium. It then passes through the bicuspid or mitral valves into the left ventricle, where it is pumped into the aorta through the aortic valves. The aorta branches into smaller and smaller arteries that finally lead to capillary beds in the tissue. Here oxygen is exchanged for carbon dioxide and returned via veins which join into the inferior vena cava (veins coming from the lower body) and superior vena cava (from the upper body). The IVC and the SVC empty into the right atrium.

Q3: explain physiology of Pulmonary system circulation?

Ans: pulmonary system circulation: pulmonary circulation is the portion of the circulatory system which carries deoxygenated blood away from the right ventricle, to the lungs, and returns oxygenated blood to the left atrium and ventricle of the heart.[1] The term pulmonary circulation is readily paired and contrasted with the systemic circulation. The vessels of the pulmonary circulation are the pulmonary arteries and the pulmonary veins.

- Deoxygenated blood leaves the heart, goes to the lungs, and then re-enters the heart; Deoxygenated blood leaves through the right ventricle through the pulmonary artery. From the right atrium, the blood is pumped through the tricuspid valve (or right atrioventricular valve), into the right ventricle. Blood is

then pumped from the right ventricle through the pulmonary valve and into the main pulmonary artery.

- Where the arteries further subdivide into smaller and smaller branches until the capillaries in the pulmonary air sacs (alveoli) are reached. In the capillaries the blood takes up oxygen from the air breathed into the air sacs and releases carbindioxide . It then flows into larger and larger vessels until the pulmonary veins (usually four in number, each serving a whole lobe of the lung) are reached. The pulmonary veins open into the left atrium of the heartheart

Lungs:

The pulmonary arteries carry deoxygenated blood to the lungs, where carbon dioxide is released and oxygen is picked up during respiration. Arteries are further divided into very fine capillaries which are extremely thin-walled. The pulmonary vein returns oxygenated blood to the left atrium of the heart.

Veins:

The oxygenated blood then leaves the lungs through pulmonary veins, which return it to the left part of the heart, completing the pulmonary cycle. This blood then enters the left atrium, which pumps it through the mitral valve into the left ventricle. From the left ventricle, the blood passes through the aortic valve to the aorta. The blood is then distributed to the body through the systemic circulation before returning again to the pulmonary circulation.

Arteries:

From the right ventricle, blood is pumped through the semilunar pulmonary valve into the left and right main pulmonary arteries (one for each lung), which branch into smaller pulmonary arteries that spread throughout the lungs