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LEVEL: 200 LEVEL

DEPARTMENT: MEDICINE AMD SURGERY

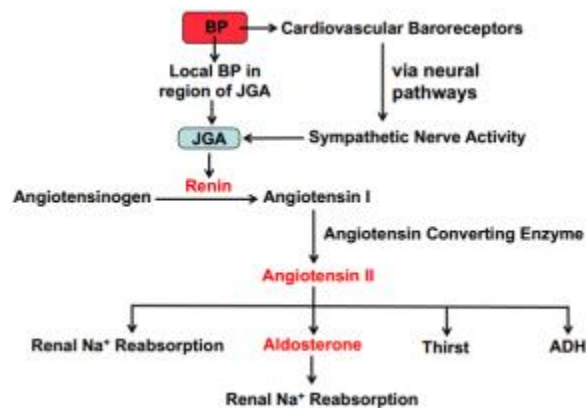
1. DISCUSS THE LONG TERM REGULATION OF MEAN ARTERIAL PRESSURE.

There are many ways to regulate the mean arterial pressure in long term.

- The first is the **RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM(RAAS)**. Renin is a peptide hormone released by the granular cells of the juxtaglomerular apparatus in the kidney. It is released in response to:
 - Sympathetic stimulation.
 - **Reduced sodium-chloride delivery to the distal convoluted tubule.**
 - **Decreased blood flow to the kidney.**

Renin facilitates the conversion of the angiotensinogen to angiotensin I which is converted to angiotensin II using angiotensin-converting enzymes (ACE).

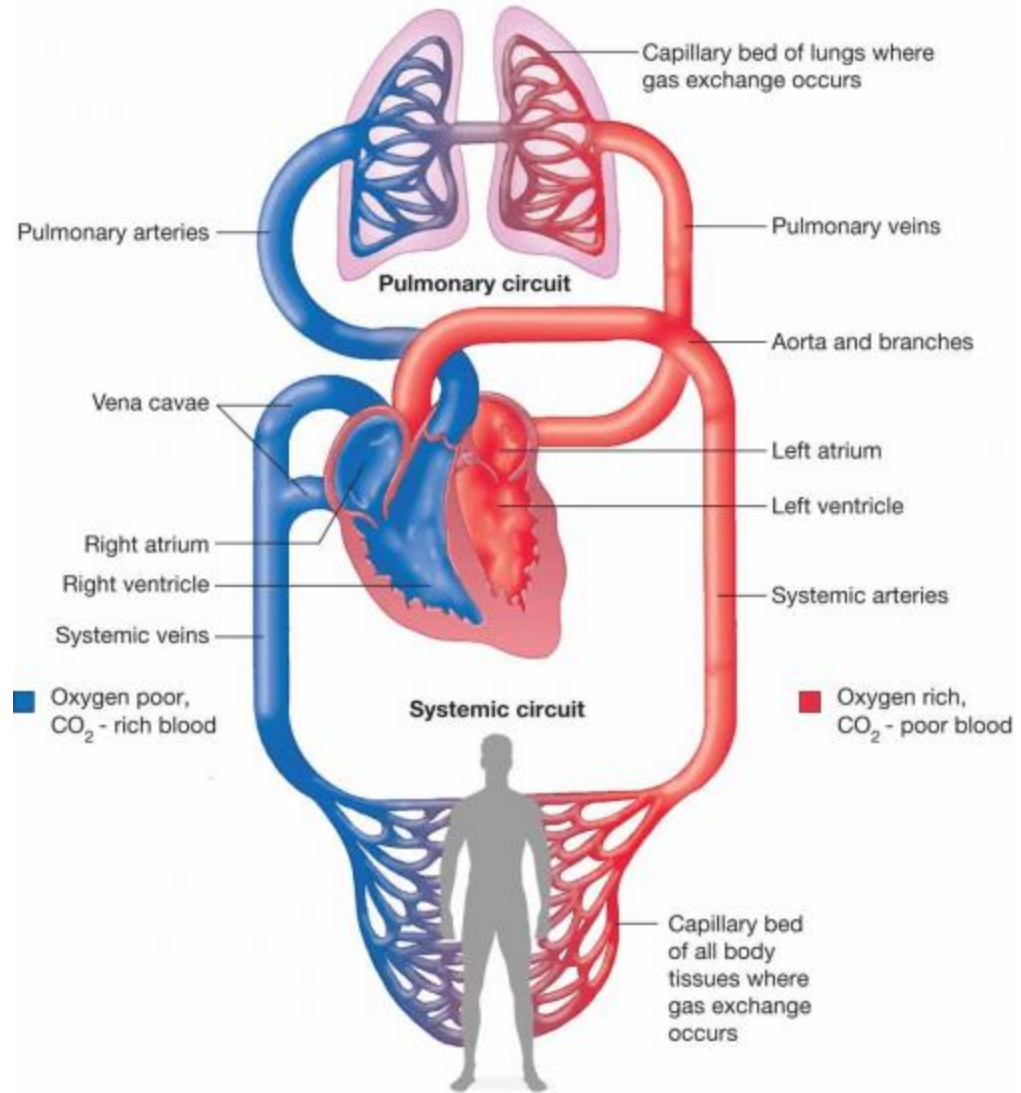
Angiotensin II is a potent vasoconstrictor. It acts directly on the kidney to increase sodium reabsorption in the proximal convoluted tubule. Sodium is reabsorbed via the sodium-hydrogen exchanger. Angiotensin II also promotes release of aldosterone. ACE also break down a substance called bradykinin which is a potent vasodilator. Therefore, the breakdown of bradykinin potentiates the overall constricting effect. Aldosterone promotes salt and water retention by acting at the distal convoluted tubule to increase expression of epithelial sodium channels, aldosterone increases the activity of the basolateral sodium-potassium ATPase then increasing the electrochemical gradient for movement of sodium ions. More sodium collects in the kidney tissue and water then follows by osmosis. This results in decreased water excretion and therefore increase volume and thus blood pressure.



- The second is the ANTI-DIURETIC HORMONE (ADH). Blood pressure is regulated by release of anti-diuretic hormone from the OVLT OF THE HYPOTHALAMUS in response to thirst or an increased plasma volume and decreased osmolality.
ADH acts to increase the permeability of the collecting duct to water by inserting aquaporin channels into the apical membrane.
It also stimulates sodium reabsorption from the thick ascending limb of the loop of Henle. This increases water reabsorption thus increasing plasma volume and decreasing osmolality.

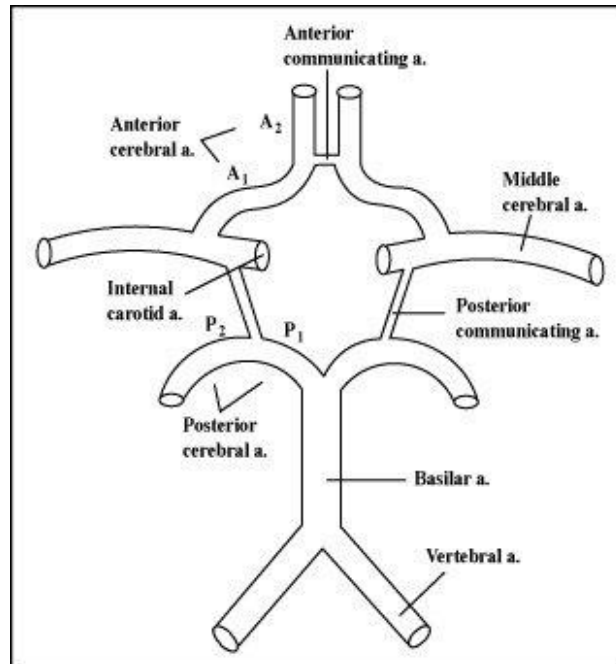
2. Write short note on the following;

- i. **Pulmonary circulation**: this deals the carrying of deoxygenated blood from the right ventricle to the lungs to get oxygenated. The pulmonary trunk splits into right and left pulmonary arteries. These arteries transport the deoxygenated blood to the arterioles and capillaries beds in the lungs. There, carbon dioxide is released and oxygen is absorbed. Oxygenated blood then passes the capillary beds through venules into pulmonary veins.



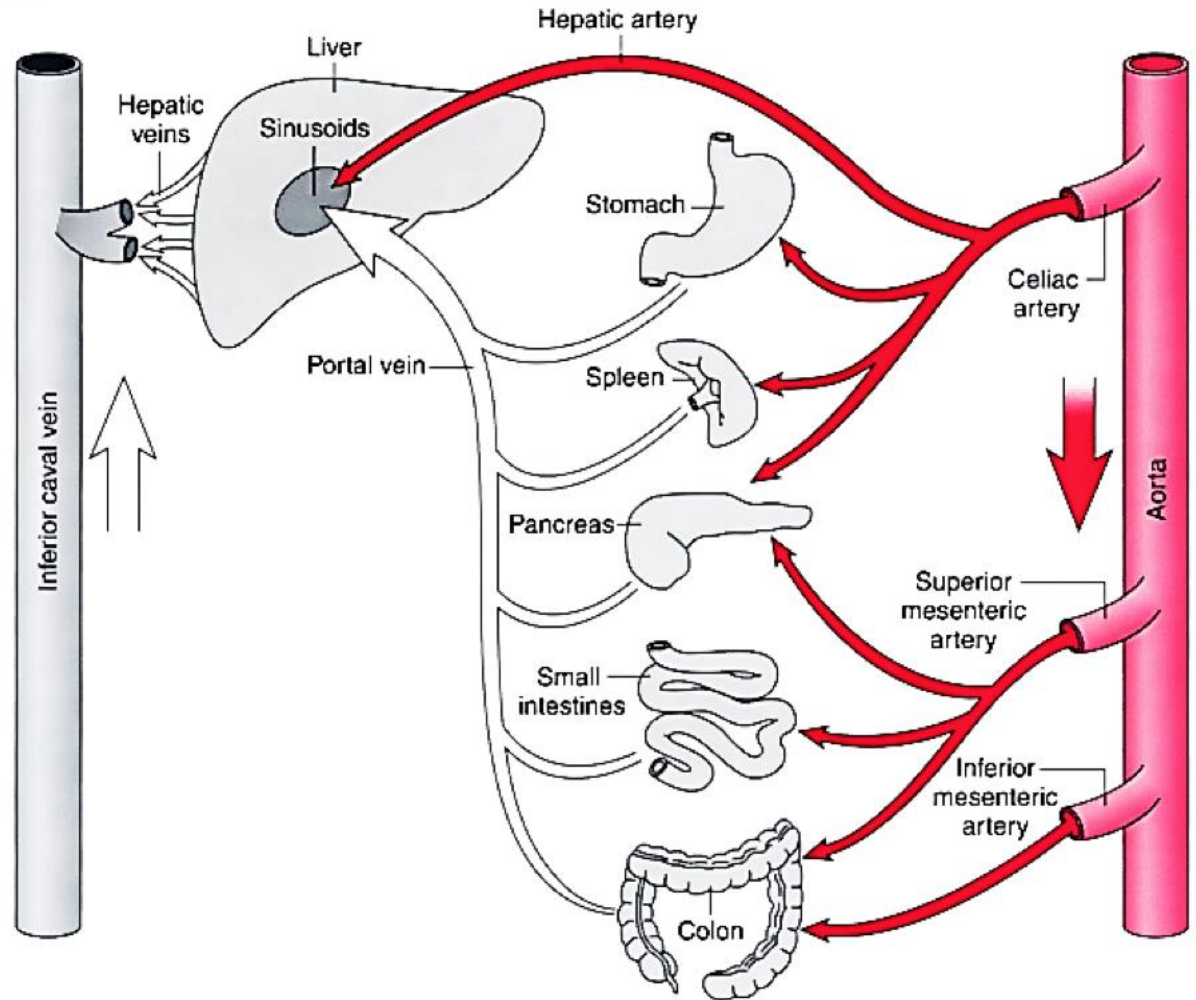
- ii. **Circle of Willis:** this is a part of cerebral circulation and is composed of the following arteries: internal carotid artery (left and right), posterior cerebral artery (left and right) posterior communicating artery (left and right). The internal carotid arteries branch into

smaller arteries that supply oxygenated blood to over 80% of the cerebrum.



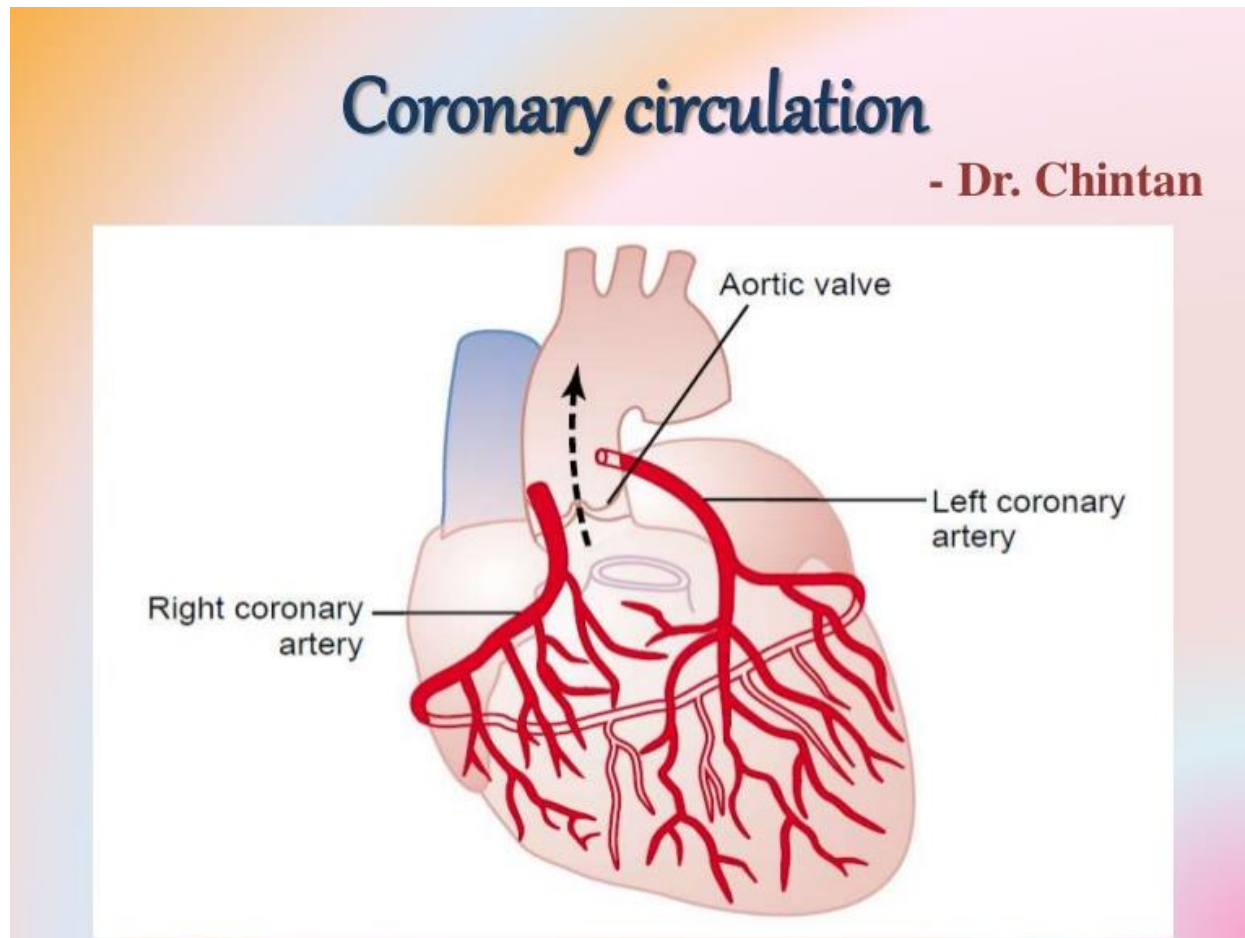
- iii. **Splanchnic circulation:** this is blood supply to the gastrointestinal tract, liver, spleen and pancreas. It is made up of two large capillary beds partially in series. The small splanchnic arterial branches supply the capillary beds and then the efferent venous

blood flows into the pulmonary vein.



- iv. **Coronary circulation:** this is the blood supply to the heart muscles. From the tissue capillaries, the deoxygenated blood returns through a system of veins to the right atrium of the heart. The coronary arteries are the only vessels that branch from the ascending aorta. The brachiocephalic, left common carotid and the left subclavian

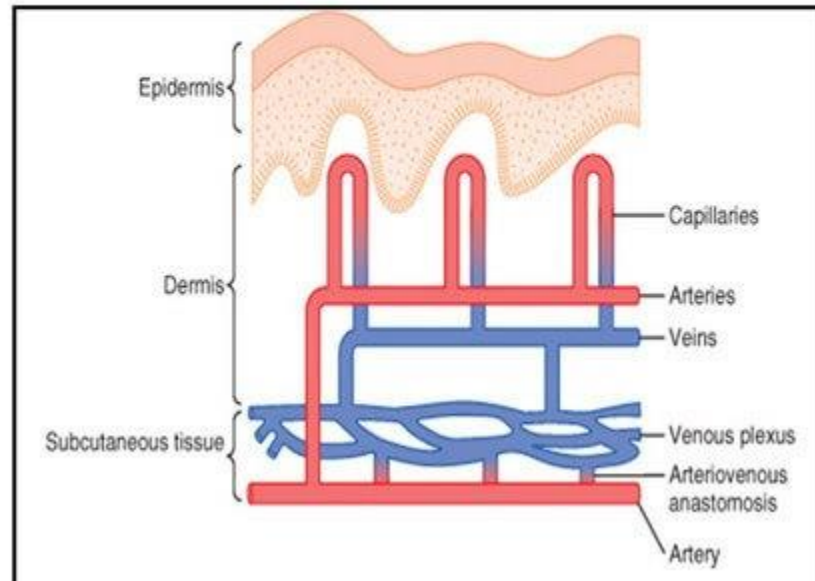
arteries branch from the aortic arch.



- v. **Cutaneous circulation:** this is the circulation and blood supply of the skin. Some of the circulating blood volume in the skin will flow through arteriovenous anastomoses instead of capillaries. Arteriovenous anastomoses serve a role in temperature

regulation.

Cutaneous Circulation



3. Discuss the cardiovascular adjustment that occur during exercise.

Cardiovascular system responses to exercise is directly proportion to the skeletal muscle demands for any given rate of work and oxygen take up. The adjustments of cardiovascular system undergo during exercise include;

- i. Increase in cardiac output or pumping capacity of the heart; designed to enhance oxygen delivery and fuel to working muscles.
- ii. During exercise, more blood is sent to the active skeletal muscles, and, as body temperature increases, more blood is sent to the skin. This process is accomplishing both by the increase in cardiac output and by the redistribution of blood flow away from areas of low demand, such as splanchnic organs.

Cardiovascular Adjustments to Exercise

