BASSEY ENYAM NKIRI

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1. **LONG TERM REGULATION OF MEAN ARTERIAL BLOOD PRESSURE**
   Mean arterial blood pressure is the average pressure existing in the arteries. It is equal to diastolic pressure + 1 ÷3 pulse pressure. Long term regulation of mean arterial blood pressure is also called renal mechanism. Activation of the renin-angiotensin-aldosterone system – A decrease in blood pressure causes the release of renin from the juxtaglomerular apparatus which converts the plasma-borne precursor angiotensinogen into angiotensin I. Angiotensin-converting enzyme (ACE) then converts angiotensin I into the active molecule, angiotensin II, which is a potent vasoconstrictor. Angiotensin II increases TPR and decreases glomerular filtration rate. It also stimulates adrenal cortex to secrete aldosterone which causes re-absorption of water and salt from the renal tubules.
2. **a) PULMONARY CIRCULATION**: It is the circulation between the heart and lungs. During this circulation, the right ventricle carries deoxygenated blood to the lungs and returns oxygenated blood to the left atrium and ventricle of the heart.

   b) CIRCLE OF WILLIS: The circle of Willis is the joining area of several arteries at the inferior side of the brain. At the circle of Willis, the internal carotid arteries branch into the smaller arteries that supply oxygenated blood to over eighty percent of the cerebrum.

   c) SPLANCHIC CIRCULATION: It is also called visceral circulation. It constitutes three portions; i) Mesenteric circulation- supplies blood to the gastrointestinal tract (stomach, pancreas and intestine). ii) Splenic circulation-supplies blood to the spleen. Two structures are involved in storage of blood in the spleen, they are splenic venous sinuses and splenic pulp which are lined with reticuloendothelial cells. Blood flow to the spleen is regulated by sympathetic nerve fibres. iii) Hepatic circulation- supplies blood to liver. Blood supply is by hepatic artery and portal vein. Liver receives the maximum amount of blood than any other organ in the body since most metabolic activities are carried out there.

d) CORONARY CIRCULATION: It is the circulation of blood within the heart. Heart muscle is supplied by 2 coronary arteries, which are the first branches of the aorta. Right coronary artery supplies the whole of the right ventricles and posterior part of left ventricle. Left coronary artery supplies the anterior and lateral parts of the left ventricle.

e) CUTANEOUS CIRCULATION: It is the blood supply to the skin. It supplies nutrition to skin and regulates body temperature by heat loss. Cutaneous blood flow increases with increase in body temperature.

3. **CARDIOVASCULAR ADJUSTMENTS DURING EXERCISE:**

a) On Blood- mild hypoxia developed during exercise stimulates the juxtaglomerular apparatus to secrete erythropoietin. It stimulates the bone marrow and causes release of red blood cells. Increased carbon dioxide content in the blood decreases the pH of blood.

b) On Blood Volume- more heat is produced during exercise and the thermoregulatory system is activated. This causes secretion of large amount of sweat leading to fluid loss, hemoconcentration, reduced blood volume and dehydration.

c) On Heart Rate- heart rate increases during exercise. Even the thought of exercise increases the heart rate. Increased heart rate during exercise is mainly caused by vagal withdrawal.

d) On Cardiac Output- increase in cardiac output is directly proportional to the increase in the amount of oxygen consumed during exercise. During exercise, oxygen increases due to increase heart rate and stroke volume.

e) On Venous Return- venous return increases during exercise because of muscle pump, respiratory pump and splanchnic vasoconstriction.

f) On Blood Flow to Skeletal Muscles- there is a great increase in the amount of blood flowing to the skeletal muscles during exercise. During muscular activity, because of compression of blood vessels during contraction, stoppage of blood flow occurs. In between the contractions, blood flow increases.