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**COURSE TITLE: PHYSIOLOGY**

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## ASSIGNMENT

1. Discuss the long term regulation of mean arterial pressure.

Ans: There are several physiological mechanisms that regulate blood pressure in the long-term, the first which is renin-angiotensin-aldosterone system (RAAS). Renin is a peptide hormone released by the granular cells of the juxtaglomerular apparatus in the kidney. Renin facilitates the conversion of angiotensinogen to angiotensin I which is then converted to angiotensin II using angiotensin-converting enzyme (ACE).

The second mechanism by which blood pressure is regulated is release Anti Diuretic Hormone (ADH) from the OVLT of the hypothalamus in response to thirst or an increased plasma osmolarity. Other factors that can affect long term regulation of blood pressure are natriuretic peptides. These include: Atrial natriuretic peptide (ANP) and prostaglandins.

2. Write short notes on the following:

- a) Pulmonary circulation: This 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. The vessels of the pulmonary circulation are the pulmonary arteries and the pulmonary veins.
- b) Circle of Willis: The circle of willis is the joining area of several arteries at the bottom (inferior) side of the brain. At the circle of willis, the internal carotid arteries branch into smaller arteries that supply oxygenated blood to over 80% of the cerebrum. The circle of

willis is formed by two groups of arteries- the internal carotid arteries and two vertebral arteries. They mostly supply blood to the occipital lobe and inferior portion of the temporal lobe.

- c) Splanchnic circulation: Also called mesenteric circulation. The splanchnic circulation describes the blood flow to the abdominal gastrointestinal organs including the stomach, liver, etc. It consists of the blood supply to the gastrointestinal tract, liver, spleen and pancreas. It consists 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 PV.
- d) Coronary circulation: This is the circulation of blood vessels that supply the heart muscle (myocardium). Coronary arteries supply oxygenated blood to the heart muscle, and cardiac veins drain away the blood once it has been deoxygenated.
- e) Cutaneous circulation: This is the circulation and blood supply of the skin. The skin is not a very metabolically active tissue and has relatively small energy requirements, so its blood supply is different to that of other tissues.

### 3. Discuss the cardiovascular adjustment that occurs during exercise.

Ans: The three major adjustments made by the cardiovascular system during exercise include; an increase in cardiac output or the pumping capacity of the heart, designed to enhance the delivery of oxygen and fuel to the working muscles, coupled with transient increase in systemic vascular resistance, elevate mean arterial blood pressure.

It is also said that long-term exercise can promote a net reduction in blood pressure at rest. During exercise, the heart is subjected to intermittent hemodynamic stresses of pressure overload, volume overload, or even both. To normalize such stress and to meet the systemic demand for an increased blood supply, the heart undergoes morphological adaptation to recurrent exercise by increasing its mass, primarily through an increase in ventricular chamber wall thickness. Adaptive remodeling of the heart in response to exercise typically occurs with preservation or enhancement of contractile function.