COURSE* *PHYSIOLOGY ASSIGNMENT
NAME* *DANIEL, GENOM ABBA
MATRIC NUMBER* *18/MHS01/120

1a) Long Term Regulation Of Mean Arterial Blood Pressure
This takes minutes to days it involves the kidneys which regulates the blood volume via the meachanism of
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 angiotensinogen to angiotensin I which is then converted to angiotensin II using
angiotensin-converting enzyme (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 breaks 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. Furthermore, aldosterone increases the activity of the basolateral sodium-potassium ATP-ase, thus 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 increased blood volume and thus blood pressure.

2a) 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. When the ventricle is divided into two chambers, producing a four-chambered heart. In these forms the pulmonary circuit begins with the right ventricle, which pumps deoxygenated blood through the pulmonary artery. This artery divides into two branches, to the right and left lungs, until it reaches the capillaries in the pulmonary air sacs. In the capillaries the blood takes up oxygen from the air breathed into the air sacs and releases carbon dioxide. It then flows into the pulmonary veins.

2b) Circle of Willis: This is a ring of interconnecting arteries located at the base of the brain around the optic chiasm or chiasma infundibulum of the pituitary stalk and the hypothalamus. This arterial ring provides blood to the brain and neighboring structures. Polygonal shape offers the possibility of alternate pathways for the blood flow, which essential for the brain's functioning.
2c) Splanchnic Circulation: This is composed of gastric, small intestinal, colonic, pancreatic, hepatic, and splenic circulations, arranged in parallel with one another. The three major arteries that supply the splanchnic organs, cellac and superior and inferior mesenteric, give rise to smaller arteries that anastomose extensively. The circulation of some splanchnic organs is complicated by the existence of an intramural circulation. Redistribution of total blood flow between intramural vascular circuits may be as important as total blood flow.
2d) Coronary circulation: This is a part of the systemic circulatory system that supplies blood to and provides drainage from the tissues of the heart. In the human heart, two coronary arteries arise from the aorta just beyond the semilunar valves; during diastole, the increased aortic pressure above the valves forces blood into the coronary arteries and thence into the musculature of the heart. Deoxygenated blood is returned to the chambers of the heart via coronary veins; most of these converge to form the coronary venous sinus, which drains into the right atrium.
2e) 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. Some of the circulating blood volume in the skin will flow through will flow through arteriovenous anastomoses (AVAs) instead of capillaries. AVAs serve a role in temperature regulation. With various adaptations of the cutaneous circulation, and its role in body temperature control.

3) **<u>CARDIOVASCULAR ADJUSMENTS THAT OCCUR DURING EXERCISE</u>**

The three major adjustments made by the cardiovascular system during exercise include one, 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. Two, an increase in local blood flow to the working muscles, and three a decrease in blood flow to other organs such as the kidneys, liver and stomach, thereby redirecting blood flow to the working muscles.Cardiac output is the amount of blood pumped from the heart in one minute, generally measured in liters per minute. It's simply calculated by heart rate, in beats per minute, times stroke volume, or the amount of blood ejected by the heart with each beat. Thus in order to increase cardiac output we can increase heart rate, stroke volume, or as it is the case during exercise, we increase both. The basic ways heart rate can increase during exercise. First, there is a reduction or withdrawal of the parasympathetic nerve activity to the heart. As parasympathetic nerve activity causes a lowering of heart rate, its withdrawal will actually result in an increase in heart rate. Second, an increase in sympathetic nerve activity to the heart will directly cause an increase in heart rate. This increase in sympathetic nerve activity will be a function of the exercise intensity. Lastly, an increase in the hormone epinephrine or adrenaline circulating in the blood will also stimulate an increase in heart rate. These adjustments are also part of the fight or flight response which you experience when nervous or frightened. This response is preparing the body for movement. Heart rate can be rapidly increased during exercise as a result of an increase in sympathetic nerve activity. Heart rate increases linearly until approaching one's maximal heart rate. This will contribute to an increase in cardiac output during the course exercise. During endurance training results have a lower, resting, and submaximal heart rates with no change in maximal heart rate. An increase in stroke volume also contributes to an increase in cardiac output during exercise. A more forceful contraction of the ventricles of the heart, resulting in more blood being pumped per beat, can be accomplished by both increasing sympathetic nerve activity and circulating epinephrine.