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MEDICINE AND SURGERY 200L

PHYSIOLOGY ASSIGNMENT

1.) 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. In order to increase cardiac output we can increase heart rate, stroke volume, or as it is the case during exercise, the cardiovascular system increases both. During exercise, 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.

2.)

A. Pulmonary circulation, also called lesser circulation, occurs when blood is pumped from the right ventricles to the lungs through the pulmonary artery. Exchange of gases occurs between blood and alveoli if the lungs at the pulmonary capillaries. Oxygenated blood then returns to the left atrium through the pulmonary veins, so the left side of the heart contains oxygenated blood and the right side of the heart contains deoxygenated blood.

B. Circle of WillisThe circle of Willis is a ring of interconnecting arteries located at the base of the brain around the optic chiasm or chiasma (partial crossing of the optic nerve – CNII; this crossing is important for binocular vision), infundibulum of the pituitary stalk and the hypothalamus. This arterial ring provides blood to the brain and neighbouring structures.

C. Splanchnic circulation, also known as visceral circulation constitutes three portions:

1. The mesenteric circulation, which supplies blood to the gatro-intestinal tract

2. The splenic circulation which supplies blood to the spleen

3. The hepatic circulation which supplies blood to the liver

D. Coronary circulation is the circulation of blood through the blood vessels of the myocardium, thereby allowing for blood supply to the heart muscle itself, since blood flowing through the chambers of the heart does not nourish the myocardium. The coronary blood vessels are:

1. Coronary arteries, namely the right and left coronary arteries. These arteries subdivide into smaller branches called epicardial arteries and give rise to final arteries or intramural vessels

2. Coronary veins, which are the coronary sinus, anterior coronary veins and thebesian vein

E. Cutaneous circulation is the blood supply to the skin. It is formed by a network of blood vessels which are: Arterioles that arise from smaller arteries and reach the papillae of the dermis, these arterioles give rise to Meta arterioles, and from the meta arterioles capillary loops arise which form collecting venules and anastomose with each other to form subpapillary venous plexus which drains into the deeper veins.

3.) Kidneys play an important role in the long-term regulation of arterial blood pressure. When the blood pressure is altered slowly over a period of time, the nervous system adapts to the altered pressure and loses the sensitivity to the altered pressure and therefore cannot regulate pressure anymore. In these conditions the renal mechanism operates efficiently to regulate the blood pressure, which is why it is known as a long term regulation of blood pressure. It is done in two ways:

a. by regulation of extra-cellular fluid (ECF): when blood pressure increases kidneys excrete large amounts of water and salt, particularly sodium. This causes a decrease in ECF volume and blood volume, which in turn brings arterial blood pressure back to normal

b. Through rennin-angiostensin mechanism: When blood pressure and ECF volume decrease, rennin secretion from the kidneys is increased. It converts angiostensinogen to angiostensin 1 which is converted to angiostensin II by ACE.

This restores blood pressure by: causing contriction of arterioles in the body so that the peripheral resistance id increased and blood pressure rises. It also stimulates the adrenal cortex to secrete aldosteronewhich increases reabsorption ofsodium from renal tubules