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COURSE: PHYSIOLOGY

ASSIGNMENT

1) LONG TERM REGULATION OF MEAN ARTERIAL BLOOD PRESSURE
The long term regulation of mean arterial pressure takes minutes to days and it involves the kidney which regulates the blood volume and when the blood volumes is regulated, the mean arterial pressure can be regulated. When the mean arterial pressure is lowered, it is detected by the kidney which makes the kidney to filter less and cause less urine. This then increases the blood volume and further increases the mean Arterial pressure. When there is a low mean arterial pressure, baroreceptors detect it so their response is to detect a little stretch compared to normal and since there is less stretch they will send a low frequency by the action potential which will cause a sympathetic response and this then makes the kidney to synthesize renin catalyses some reactions and then, a hormone called angiotensin II is produced. This hormone acts on the adrenal cortex which causes the synthesis and secretion of aldosterone and this increases sodium reabsorption which also increases water reabsorption. When these reabsorptions are increased, the blood volume goes up and increases mean arterial pressure. Angiotensin II also targets the posterior pituitary which causes the release of anti-diuretic hormone (ADH). This makes you to urinate less. The anti-diuretic hormone causes vasoconstriction which increases the mean arterial pressure. A clinical significance is when a patient has a haemorrhage. When a patient has a haemorrhage, it causes a decrease in the blood volume which causes a decrease in venous pressure, venous return and cardiac output. The mean arterial pressure reduces so the kidney responds by producing less urine by conserving water and salt which increases the blood volume back and then the central venous pressure increases due to more venous return to the heart and so, the arterial pressure goes back to normal.

So, the mean arterial pressure fell due to the patient haemorrhaging but, when the kidney responded, it was able to get back to normal.

2a) PULMONARY CIRCULATION

This is the system of transportation that shunts de-oxygenated blood from the heart to the lungs to be re-saturated with oxygen before being dispersed into the systemic circulation. This circulation begins on the right ventricle and ends on the left atrium. The pulmonary trunk splits into the right and left pulmonary arteries. These arteries then transport the deoxygenated blood to arterioles and capillary beds in the lungs. Oxygenated blood then passes from the capillary beds through venules into the pulmonary veins

b) CIRCLE OF WILLIS: Circle of Willis is the joining area of several arteries at the bottom side of the brain. At this joining area, the internal carotid arteries branch into smaller arteries that supply oxygenated blood to over 80% of the cerebrum. They run along either side of the neck and leads directly to the circle of Willis. Each carotid artery branches into the right and left carotid artery. The circle of Willis allows equalization of blood flow between the left and right cerebral hemispheres and can also allow anastomotic circulation if the parts are included. It also serves as a valve function for the brain. The most common anomaly of circle of Willis is hypoplasia

c) SPLANCHNIC CIRCULATION: This is 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. The arterial supply to the splanchnic bed comprises of three division of the abdominal aorta. The coeliac artery, the superior and inferior mesenteric arteries. Under normal conditions, blood flow into the splanchnic circulation is controlled via intrinsic and extrinsic mechanisms. The splanchnic bed forms a circulatory reservoir which can be mobilized during periods of physiological stress. Disorders of the splanchnic circulation may contribute to the multi-organ dysfunction and a number of techniques used in anaesthesia and critical care influence the distribution of blood flow in the splanchnic circulation.

d) CORONARY CIRCULATION: This is the circulation of the blood vessels that supply the heart muscles. Coronary arteries supply oxygenated blood to the heart muscle and cardiac vein drains away the blood once it has been deoxygenated. The heart normally extracts 70 to 75 percent of the available oxygen from the blood in coronary circulation which is more than the amount extracted by other organs from their circulation.

e) CUTANEOUS CIRCULATION: This is the supply of blood to the skin. The blood supply to the skin is different from other places because it has low energy requirements compared to other places. The circulation in the skin is involved in the regulation of blood pressure and also plays an essential role in thermal homeostasis of man.

3) CARDIOVASCULAR ADJUSTMENT THAT OCCURS DURING EXERCISE

During cardiovascular adjustment, there are changes that occur. There are different types of exercises and they are isometric and isotonic. The major events take place in the cardiovascular system during exercise and they are; an increase in cardiac output or increased pumping capacity of the heart, increase in blood flow of working muscles and decrease in blood flow to other places. The cardiac output is increased during exercise due to the increment in heart rate and stroke volume. Heart rate is increased when there is a reduction in the parasympathetic nerve activity to the heart and also an increase in the sympathetic activity of the heart due to intensity of the exercise would lead to an increase in heart rate.an increase in the hormone called adrenalin also increases the heart rate. Heart rate increase is linear until it is about to reach the maximum heart rate and this contributes to an increase in cardiac output. The increase in stroke volume is due to the increase in sympathetic stimulation. For the increase in blood flow, there needs to be an increase in blood flow so that it can supply the muscles been used for the exercise. The extra pressure stretches walls of the blood vessel which may increase muscle flow by likes 20 times. Sympathetic stimulation also has to occur to increase the arterial pressure. The increase can be as little as 20mmHg or as much as 80mmHg depending on the kind of exercise been performed. Cardiovascular adjustment is necessary during exercise because the muscles been used need more oxygen a d nutrients when the exercise is been done