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1. Discuss the long term regulation of Mean Arterial Blood Pressure.

One of the major organs that respond the heart activity is the kidney. In a decompensating heart, i.e, heart close to failure, the long term regulation is used. The kidney seats in the plasma part of the blood, when there is a drop in blood pressure, from the renal there is a joxtaglomerula apparatus closed to the proximal convoluted tubule. The cell located in the joxtaglomerula apparatus are responsible for the production of hormone renin.

The kidney senses change a in the blood pressure and stimulates the release of renin. The renin activates angiotesinogen produced from the kidney to angiotesinogen I. The angiotesinogen I is inactive until there is a release of angiotesinogen releasing enzyme ftom the lungs which converts angiotesinogen I to active angiotesinogen II and then the vasoconstrictor increases the blood pressure by increasing the resistance blood flow.

Function of angiotesinogen II.

1. It can increase the sympathetic activity there by increase the heart rate and cardiac output.
2. Angiotesinogen can stimulate the production of aldosterone. Aldosterone will cause the electrolyte reabsorption of sodium and water from the kidney into the peritubular capillary into the interstitial cells there by increasing blood flow.
3. Angiotesinogen will cause the release of ADH, antidiuretic hormone.

2. Write a short note on,

Pulmonary circulation: pulmonary blood vessels include the pulmonary artery which carries deoxygenated blood to alveoli of the lungs and bronchial artery, which supply oxygenated blood to other lungs.

The pulmonary artery supplies deoxygenated blood pumped from the right ventricle to alveoli of the lungs(pulmonary circulation). After leaving the right ventricle, the artery divides into right and left branches. Each branch enters the corresponding lung along with primary bronchus. The bronchial artery arises from descending thoracic aorta. It supplies arterial blood to bronchi, connective tissue and other structure of lung stroma, visceral pleura and pulmonary lymph nodes. Venous blood from these structures is drained by two bronchial veins from each side. Bronchial veins from right side drain into azygous vein and left bronchial veins drain into superior hemiazygous veins.

The pulmonary blood flow, lungs receive the whole amount of blood that is pumped out the same in both right and left ventricle. Output of blood per minute is the same in both right and left ventricle. About 5L. The blood pressure are more distensible than systemic blood vessels. The entire pulmonary vascular system is a low pressure bed.

Splanchnic circulation: Also known as visceral circulation. It constitutes three portions, mesenteric circulation supplying blood to the GI tract, splenic circulation supplying blood to the spleen and hepatic circulation supplying blood to the liver.

Mesenteric circulation; distribution of blood flow.

Stomach: 35mL/100g/minute

Intestine: 50mL/100g/minute

Pancreas: 80mL/100g/minute

Regulation of mesenteric blood flow is regulated by, local autoregulation, activity of GI tract that is contraction of the wall of GI tract reduces blood flow due to compression of blood vessels. Nervous factor, mesenteric blood flow is regulated by sympathetic nerve fibers. Increase in the sympathetic activity as in the cause of emotional condition constrict the mesenteric blood vessels.

Splenic circulation: spleen is known as the main reservoir for blood. Due to dilation of blood vessel a large amount of blood is stored in spleen and the constriction of blood vessels by sympathetic stimulation releases blood into circulation. In spleen, two structure involved in storage of blood, namely splenic venous sinuses and splenic pulp. Small arteries and arterioles open directly into the venous sinuses. When spleen distends, sinuses swell and large quantity of blood is stored. Venous sinuses are lined with reticuloendothelial cells.

Blood flow is regulated by sympathetic nerve fibers.

Hepatic circulation: liver receive blood from two sources, hepatic artery and portal vein. Liver receives maximum amount of blood as compared to any other organ in the body since, most of the metabolic activities are carried out in the liver. Blood flow to the liver is 1,500mL/minute, while 30℅ of cardiac output. It's about 100mL/100g of tissue/minute.

Blood flow to the liver is regulated by systemic blood pressure, an important factor responsible for blood flow to liver and hepatic blood flow. Spelenic contraction, movement of intestine etc.

Coronary circulation: coronary arteries supply the heart muscle, the right and left coronary arteries which are the first branch of aorta. Right and left coronary arteries supply the whole of the right ventricle and posterior portion of left ventricle, lateral and anterior part of left ventricle respectively. The coronary arteries divide and subdivide into smaller branches, which run along the surface of the heart. Smaller branches are called epicardiac arteries and give ruse to further smaller branches known as final or intramural vessels. Final arteries run at right angle through the heart muscles, near the inner aspect of the wall of the heart.

Venous drainage from heart muscle is by three types of vessels, coronary sinus, anterior coronary veins and thebesian vein.

Cutaneous circulation: cutaneous blood vessels is formed in the following manner:

1. Arterioles arising from the smaller arteries reach the base of papillae of dermis.2. Then, these arterioles turn horizontally and give rise to meta-arterioles.

3. From meta-arterioles, hairpin-shaped capillary loops arise. Arterial limb of the loop ascends vertically in the papillae and turns to form a venous limb, which descends down.

4. After reaching the base of papillae, few venous limbs of neighboring papillae unite to form the collecting venule.

5. Collecting venules anastomose with one another to form the subpapillary venous plexus.

6. Subpapillary plexus runs horizontally beneath the bases of papillae and drain into deeper veins.

Function of coronary circulation is to Supply nutrients to skin. Regulation of body temperature by heat loss.

Coronary circulation is maintained by; Cutaneous blood flow is regulated mainly by body temperature. Hypothalamus plays an important role in regulating cutaneous blood flow. When body temperature increases, the hypothalamus is activated. Hypothalamus in turn causes cutaneous vasodilatation by acting through medullary vasomotor center. Now, blood flow increases in skin. Increase in cutaneous blood flow causes the loss of heat from the body through sweat. When body temperature is low, vasoconstriction occurs in the skin. Therefore, the blood flow to skin decreases and prevents the heat loss from skin.

3. Cardiovascular adjustment that occurs during endurance activities.

Cardiac output is a determining factor during endurance activities. The following adjustment takes place;

1. Chemo/baroreceptor detects changes in the body.
2. Stimulation cardiovascular control center.
3. Sympathetic activity increases via cardiac accelerator center.
4. Thereby increase heart rate, stroke volume which in turn increases cardiac output.