Physiology Assignment
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Assignment on Cardiovascular Physiology

1) Long term Regulation of Mean Arterial Blood Pressure

Answer

There are various ways in which the blood pressure is regulated for a long term

A) Renin Angiotensin Aldosterone System:
Renin is a peptide hormone released in the granular cells of the juxtaglomerular apparatus in the kidneys. It is released in response to a low blood pressure and it works by converting Angiotensinogen to Angiotensin II which is a strong vasoconstrictor. The enzyme Angiotensin converting enzyme also breaks down bradykinin which is a vasodilator.

Angiotensin also promotes the production of Aldosterone which improves water retention. Water retention leads to an increase in blood volume and overall blood pressure.

B) Anti Diuretic Hormone: This hormone is released by the hypothalamus in response to increased plasma osmolarity. It functions to increase the permeability of the collecting ducts of the nephrons to water by inserting aquaporin channels.
It also facilitated water reabsorption from the ascending limb of the loop of Henle. Hence reducing plasma osmolarity, improving blood volume and pressure.

C) Prostaglandins: these are vasodilator that also restrict the reabsorption of sodium and hence water. It reduces plasma osmolarity and prevents excessive vasoconstriction

D) Atrial Natriuretic Peptides: they are synthesized and stored my cardiac myocyyes. It is released due to high blood pressure. It promotes sodium excretion and dilates the blood vessels.

2) Write short notes on the following

A) Pulmonary circulation:
deoxygenated blood from the body tissues are returned to the heart through the vena cava into the right Atria. The blood flows to the right ventricle and is pumped out to the pulmonary trunk.
The pulmonary trunk bifurcates into the left and right pulmonary arteries which carry the

deoxygenated blood to the left and right lung arterioles and then capillary beds where it is Oxygenated, passes through the capillary beds into the venules and returned to the heart through the pulmonary veins into the left Atria.

This circulation is parallel to the systemic circulation. It is the process that is required to supply oxygen to the blood after tissues have used up the oxygen supplied to them from the previous oxygenated blood. The deoxygenated blood taken to the lungs have a high carbon dioxide content and in the lungs, it is being released and excreted

B) Circle of Willis:
This is found around the stalk of the pituitary gland and provides communication between the blood supply of the forebrain and hind brain, that is, the internal carotid arteries and vertebro-basilar systems. A well developed communication is found in less than half of the population. It provides a safety valve function for the brain allowing a collateral circulation.
The left and right internal carotid arteries bifurcates into an anterior and middle cerebral arteries. The anterior parts join together and supply the midline portion of the frontal lobe and superior medial parietal lobe. The middle part supplies the lateral part of the hemisphere. They both make up the anterior circulation.
The Basilar artery from the left and right vertebral arteries branch into a left and right posterior cerebral artery forming the posterior circulation Which supplies the occipital lobe and inferior temporal lobe.

C) Splanchic Circulation:
This is the blood supply to the gastrointestinal tract, liver, spleen and pancreas. There are 3 major arteries that supply these splanchic organs: the Celiac artery, the superior and Inferior Mesenteric arteries. These give off smaller arteries that anastomoses with each other. Numerous extrinsic and intrinsic factors influence the splanchnic circulation. Extrinsic factors include general hemodynamic conditions of the cardiovascular system, autonomic nervous system, and circulating neurohumoral agents. Intrinsic mechanisms include special properties of the vasculature, local metabolites, intrinsic nerves, paracrine substances, and local hormones. it is part of the systemic circulation

D) Coronary Circulation:
this is the circulation of blood vessels that supply the heart muscle. The coronary artery provides oxygenated blood to the muscle of the heart while the coronary vein removes the deoxygenated blood. It is part of the systemic circulation. Two coronary arteries arise from the aorta just beyond the semilunar valves. During diastole, the increased aortic pressure forces blood into the coronary arteries. The coronary vein forms a network, a venous sinus which drains into the right atria.
The heart takes 70-75% of the oxygen supplied from the coronary circulation.

E) Cutaneous circulation:
This is the blood supply of the skin. Due to the low metabolic activity of the skin, it's blood supply is slightly different. Circulation in the skin will flow through ateriovenous anastomoses which are low resistance connections between the small arteries and veins which supply and drain the blood

used by the skin. Due to the absence of capillaries, it allows the shiny of blood directly into the venous plexus. since Arteriovenous anastomoses do not have capillary sections, then they're not involved in the transportation of nutrients to the tissues. But are involved in temperature regulation.

3) Discuss the cardiovascular adjustment that occur during exercise

Answer

The major cardiovascular adjustment during exercise is the increase in cardiac output to supply the skeletal muscles. This is a result of an increase in the heart rate and a slight increase in the end diastolic volume and a reduction of the end systolic volume which increases the stroke volume. The reduction of end systolic volume is due to an increased contractility mediated by Beta andrenergic stimulation.

Exercise induces tachycardia, the faster heart beat results in a faster heart rate, increases cardiac output.

Since blood vessels are part of the cardiovascular system, the blood vessels dilate to accommodate more blood to supply to the muscles, an increased blood pressure and also plays a role in temperature regulation during exercise to avoid overheating of the system.