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COLLEGE: MEDICINE AND SURGERY

MATRIC NUMBER: 18/MHS01/220

COURSE: PHYSIOLOGY

1. Discuss the regulation of the long term mean arterial blood pressure.

There are several physiological mechanisms that regulate blood pressure in the long term, the first of which is renin-angiotensin-aldosterone system(RAAS).

renin**-angiotensin-aldosterone system(RAAS).** Renin is a peptide hormone released by the grandular 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 convulated tubule to increase expression of epithelial sodium channels. Furthermore, aldosterone increase 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.

1. Write short notes on the following:

* Pulmonary circulation- 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. The vessels of the pulmonary circulation are the pulmonary arteries and the pulmonary veins.
* Circle of willis- is the joining area of several aerteries at the bottom side of the brain. At the circle of Willis the internal carotid arterties branch into smaller arteries that supply oxygenated blood to over 80% of the cerebrum.
* Splanchinc circulation- consists of 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, and then the efferent venous blood flows into the PV.
* Coronary circulation- is the circulation of the blood vessels that supply the heart muscle (myocardium). Coronary arteries supply oxygenated blood to the heart muscles, and cardiac veins drain away the blood once it has been deoxygenated
* Cutaneous circulation- 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.

1. Discuss the cardiovascular adjustment that occurs during exercise?

During exercise, more blood is sent to the active skeletal muscles, and as body temperature increase, more blood is sent to the skin. This process is accomplished both by the increase in cardiac output and by the redistribution of blood flow away from areas of low demand such as the splanchnic organs.