NAME: PEPPLE, BIETONYE APIAFI

MATRIC NUMBER: 18/MHS01/330

PHYSIOLOGY ASSIGNMENT (16-27TH JUNE 2020)

1. Discuss the long-term regulation of mean arterial blood pressure.
   It is very important to establish the fact that:
   Mean arterial blood pressure= cardiac output x total peripheral resistance.
   Short term regulation of blood pressure is by the autonomic nervous system but long term regulation involves so much more and I would be explaining them below
   <u>The physiological mechanisms that regulate blood pressure in the long-term</u>

   1. Anti-Diuretic Hormone (ADH): ADH is a hormone released by the hypothalamus to respond to increased plasma osmolarity or thirst.

   This is what ADH does: it inserts aquaporin channels into the apical membrane of the water collecting duct in the kidney to increase its permeability and ADH also stimulates sodium reabsorption from the thick ascending part of the Henle's loop, this increases water reabsorption, thus increasing plasma volume and decreasing the osmolarity.

   2. Renin-Angiotensin-Aldosterone System (RAAS): Renin (a peptide hormone) is very vital here, it causes sodium to collect in the tissue, which then causes water to flow by osmosis, thereby decreasing water excretion and increasing blood volume as well as blood pressure. Renin does some angiotensin conversions and it results in the production of a vasoconstrictor which acts on the kidney to increase sodium reabsorption.

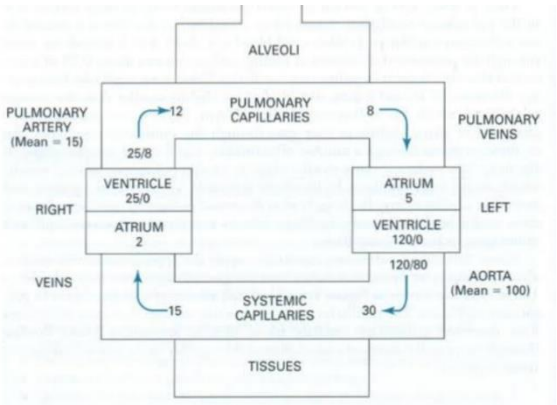
   3. Natriuretic peptides- atrial natriuretic peptide (ANP).

   APN is produced and stored in cardiac myocytes and it is released when the atria are stretched (high blood pressure). APN promotes sodium excretion and dilates the afferent

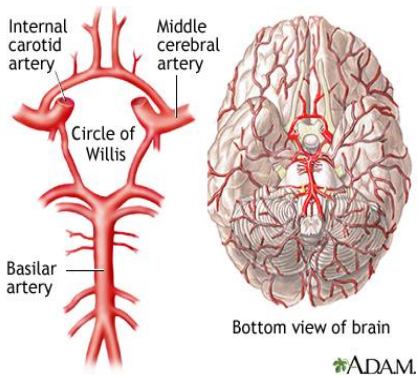
arteriole of the glomerulus, increasing blood flow and inhibiting sodium reabsorption.

4. Prostaglandins: increase blood flow and reduce sodium reabsorption.

2. Write short notes on the following
   a. Pulmonary circulation: it is the system of transportation that involves the movement of deoxygenated blood from the right ventricle to the lungs via the pulmonary artery for oxygenation and moving the oxygenated blood back to the left atrium and left ventricles of the heart via the pulmonary vein.



   b. Circle of Willis: it is the anastomosis of arteries that sit at the base of the brain. It is the joining of several arteries at the inferior part of the brain.

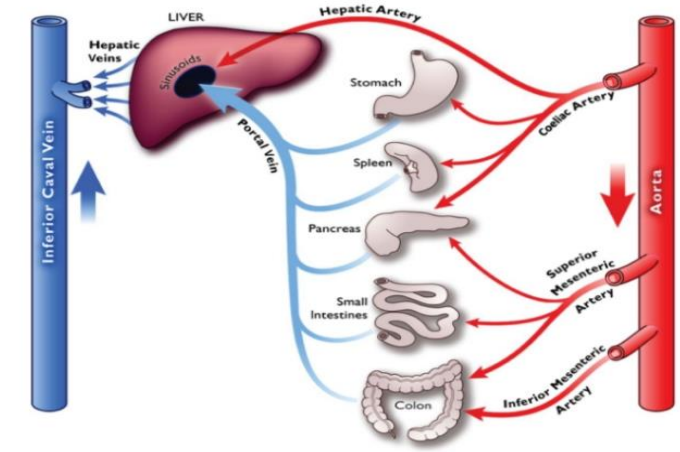


At the circle of Willis, the internal carotid arteries branch into smaller arteries which supply oxygenated blood to over 80% of the cerebrum in the brain.

It creates redundancy for collateral circulation in the cerebral circulation.

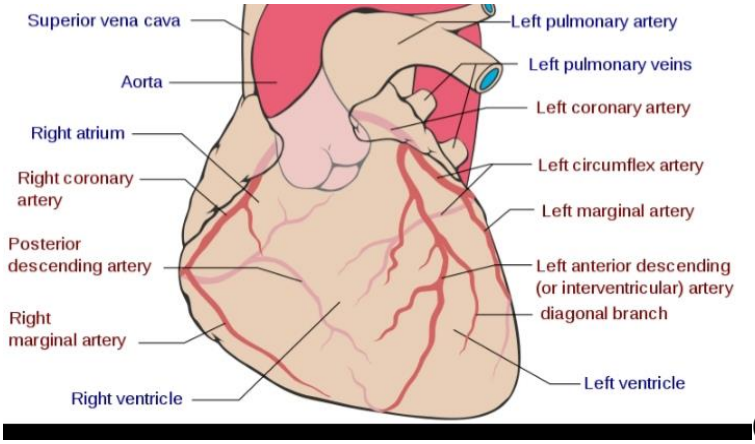
c. Splanchnic circulation: Splanchnic circulation refers to the blood flow to abdominal gastrointestinal organs (spleen, small intestine, large intestine, liver, pancreas and the stomach). It comprises 3 major branches of the abdominal aorta
   1. The coeliac artery
   2. Superior mesenteric artery
   3. Inferior mesenteric artery

: representation of the splanchnic circulation.1



It comprises of the gastric, small intestinal, colonic, pancreatic, hepatic and splenic circulations arranged in parallel with one another.

d. Coronary circulation: this refers to the circulation/ movement of blood within the blood vessels that supply the heart muscle. Coronary arteries and veins are involved here and they perform the normal functions of arteries and veins. It supplies papillary muscles and aids changes in diastole and



Oxygen demands.

e. Cutaneous circulation: this refers to the blood supply to the skin. The skin requires little energy because it not very metabolically active and so blood would flow through atriovenous capillaries(low resistance connections between the small arteries and veins that supply and drain the skin) the type of circulation helps the skin play a major role in temperature regulation

3. Discuss the cardiovascular adjustment that occurs during exercise.

   During exercise, the cardiovascular adjustment that occurs is AN INCREASE IN CARDIAC OUTPUT

   It is a known fact that

   Cardiac output= stroke volume x heart Rate

   When you exercise, your heart beats faster and more blood is being pumped per beat and per minute. And increase in the above factors leads to an increase in the cardiac output.

   I would be explaining it professionally:

   1. Chemoreceptors detect a reduction in the available oxygen and an increase in CO2. These changes occur during exercise.
   2. Baroreceptors detect a change in pressure
   3. The above would stimulate the cardiac control centre
   4. It would then initiate sympathetic impulses via the accelerator nerves

5. The accelerator nerve would then increase the SA node impulse
6. This would then result in an increased heart rate and stroke volume because during exercise, the body needs more oxygen.
7. An increase in stroke volume and heart rate would lead to an increase in cardiac output.