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MATRIC NO: 18/MHS01/309

COURSE CODE: PHS 201

ASSIGNMENT

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

In each cardiac cycle arterial blood pressure fluctuates between diastolic and systolic pressure. However, the body behaves from day to day as if it regulated the mean arterial blood pressure, which is the average between diastolic and systolic pressures. Such regulation is achieved by interdependent adjustments of only 3 parameters: Heart rate (HR), ventricular stroke volume (SV) and total peripheral vascular resistance (TPVR). These are related as follows: HR - SV = Cardiac Output (CO); CO - TPVR = Mean Arterial Blood Pressure. The regulatory system includes stretch-sensitive sensors, central nervous integrators/evaluators and neuro-humoral effector mechanisms. Central nervous integration and evaluation of incoming signals occurs mostly in the pons/medulla regions of the midbrain. The most important effector mechanisms are the parasympathetic and sympathetic divisions of the autonomic nervous system, the renin-angiotensin system and vasopressin. Long-term regulation involves mainly the regulation of extracellular fluid volume by pressure natriuresis mechanisms residing in the kidney and by widespread actions of angiotensin 2. Studies in hypertensives have suggested that the long-term-controlled variable is not arterial blood pressure, but the balance between intake and output of fluid and electrolytes. If the kidney requires a higher perfusion pressure to achieve that balance then daily blood pressure regulation occurs around an appropriately higher setpoint. Long-term blood pressure regulation involves renal regulation of blood volume via the renin- angiotensin mechanism and aldosterone mechanism.

1. Write short notes on the following
2. PULMONARY CIRCULATION : Pulmonary circulation 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 systemic circulation. It then flows through the pulmonic valve into the pulmonary artery before being delivered to the lungs.

Deoxygenated blood leaves the heart, goes to the lungs, and then re-enters the heart; Deoxygenated blood leaves through the right ventricle through the pulmonary artery. From the right atrium, the blood is pumped through the tricuspid valve (or right atrioventricular valve), into the right ventricle. Blood is then pumped from the right ventricle through the pulmonary valve and into the main pulmonary artery.

1. CIRCLE OF WILLS : The circle of Willis consists of an arterial network located at the skull base allowing arterial blood flow exchange between the anterior and the posterior circulation, and between the right and left hemispheres. Several imaging techniques may be useful to provide anatomical information of the main branches of the circle of Willis including digital subtraction angiography (DSA), Doppler ultrasound, magnetic resonance (MR) angiography, and computed tomography angiography. Each technique has its own advantages and limitations but due to the invasive nature of conventional angiography, which was the method of reference in the past, the current tendency is to combine several noninvasive imaging modalities such as Doppler ultrasound and MR angiography.
2. SPLANCHIC CIRCULATION : describes the blood flow to the abdominal gastrointestinal organs including the stomach, liver, spleen, pancreas, small intestine, and large intestine.The hepatic portal circulation delivers the majority of the blood flow to the liver. It comprises three major branches of the abdominal aorta; the coeliac artery; superior mesenteric artery (SMA); and inferior mesenteric artery (IMA) .The hepatic portal circulation delivers the majority of the blood flow to the liver.
3. CORONARY CIRCULATION : Coronary circulation is the circulation of blood in the blood vessels that supply the heart muscle (myocardium). Coronary arteries supply oxygenated blood to the heart muscle, and cardiac veins drain away the blood once it has been deoxygenated. Because the rest of the body, and most especially the brain, needs a steady supply of oxygenated blood that is free of all but the slightest interruptions, the heart is required to function continuously. Therefore its circulation is of major importance not only to its own tissues but to the entire body and even the level of consciousness of the brain from moment to moment. Interruptions of coronary circulation quickly cause heart attacks (myocardial infarctions), in which the heart muscle is damaged by oxygen starvation. Such interruptions are usually caused by ischemic heart disease (coronary artery disease) and sometimes by embolism from other causes like obstruction in blood flow through vessels.
4. CUTANEOUS CIRCULATION : The 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. Some of the circulating blood volume in the skin will flow through will flow through arteriovenous anastomoses (AVAs) instead of capillaries. AVAs serve a role in temperature regulation. In this article we shall consider the different adaptations of the cutaneous circulation, and its role in body temperature control.
5. Discuss the cardiovascular adjustment that occurs during exercise?

During exercise, the circulation is adjusted in such a way that the active muscles as well as the vital organs get blood supply to a greater proportion than that of the inactive organs and the non-vital organs. It has been observed that the active muscle gets more blood supply during exercise and the circulation is increased more than about 30 times. It is claimed that this greater supply is due to decrease of vascular resistance caused by locally accumulated metabolites. During exercise sudden lack of O2 caused the increased accumulation of CO2, lactic acid, adenosine, intracellular K+ and histamine. These substances may cause hyperaemia (reactive hyperaemia) and thus the resistance to blood flow is decreased.

As the work load of the heart is increased tremendously during exercise, the coronary flow is increased accordingly to its own nourishment, otherwise hypoxia may prevail. So in moderate exercise, coronary flow is increased according to the O2 requirement of the cardiac muscle. But in severe exercise, the coronary flow may be increased no doubt, but the cardiac muscle due to tremendous increase of heart rate, will fail to maintain its O2 according to its need and the subject may feel anginal pain. Pulmonary circulation during exercise is increased in proportion to the increase in venous return to the heart. But with the increase of pulmonary circulation, the pulmonary arterial pressure is insignificantly increased possibly due to distensibility of its blood vessels. Blood flow to the brain is relatively under normal state and remains mostly unaltered during exercise.

During exercise the blood flow in the active muscle, lung, heart is increased, but the same in the abdominal organ, kidneys and in the skin; (initially) is greatly decreased due to compensatory vasoconstriction. This happens possibly through the chemoreceptor reflex initiated by the accumulated metabolites during exercise so as to cause redistribution of blood from abdominal organs to the exercising muscle, heart, lung and skin (later stage). Skin blood flow is initially decreased but as the work is continued and the body temperature is increased the skin blood flow is also increased only to eliminate excess heat produced by the contracting muscle.

REFERENCES: WIKIPEDIA

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