

Long-term regulation of mean arterial blood pressure

Changes in cardiac output and systemic vascular resistance. Cardiac output is determined by the product of stroke volume and heart rate. Stroke volume is determined by inotropy and ventricular preload. Mean arterial blood pressure 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;

$$HR \times SV = \text{Cardiac Output(CO)}$$

$$CO \div TPVR = \text{Mean Arterial Blood Pressure.}$$

The regulatory system includes stretch sensitive sensors, Central Nervous System/Evaluators and Neuro humoral effector mechanism.

- **Pulmonary circulation;**

This is a portion of the circulatory system which carries deoxygenated blood away from the right ventricle to the lungs, and return oxygenated blood to the left atrium and ventricle of the heart. The pulmonary circulation is paired and contrasted with systemic circulation.

- **Circle of willis;**

This is the joining area of several arteries at the bottom(inferior) side of the brain. At the circle of willis, the internal carotid arteries branch into smaller arteries that supply oxygenated blood to over 80% of the cerebral.

- **Splanchnic circulation;**

Mesenteric circulation. Thus consist 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 different venous blood flows into the PV.

- **Coronary circulation;**

This is the circulation of blood in the blood vessel 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.

- **Cutaneous circulation;**

This 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 it's blood supply is different to that of other tissues.

The cardiovascular adjustment that occur during exercise

During exercise, more blood is sent to the active skeletal muscles, and, as body temperature increases, more blood is sent to the skin. Thus 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.

Akachukwu Bonaventure

Mbbs

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Physiology