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MBBS

PHYSIOLOGY

1. DISCUSS THE LONG -TERM REGULATION OF MEAN ARTERIAL

BLOOD PRESSURE ?

The long -term level of arterial pressure is dependent on the

relationship between arterial pressure and the urinary output of

salt and water, which, in turn, is affected by a number of factors,

including renal sympathetic nerve activity (RSNA); The

paraventricular nucleus (PVN) in the hypothalamus has major direct

and indirect connections with the sympathetic outflow and there is

now considerable evidence that tonic activation of the PVN

sympathetic pathway contributes to the sustained level of RSNA

that occurs in conditions such as heart failure and neurogenic

hypertension. The tonic activity of PVN sympathetic neurons, in

turn, depends upon the balance of excitatory and inhibitory

inputs.A number of neurotransmitters and neuromodulators are

involved in these tonic excitatory and inhibitory effects, including

glutamate, GABA, angiotensin ii and nitric oxide.

The dorsomedial hypothalamic nucleus (DMH) also exerts a

powerful influence over sympathetic activity, including RSNA,

through synapses with sympathetic nuclei in the medulla and,

possibly, also other brain stem regions. The DMH sympathetic

pathway is an important component of the phasic

sympathoexcitatory responses associated with acute stress, but

there is no evidence that it is an important component of the

central pathways that produce long-term changes in arterial

pressure .

2. A SHORT NOTE ON THE FOLLOWING

A. PULMONARY CIRCULATION

This is the portion of the circulatory system that carries

deoxygenated blood away from the the right ventricle , to the

lungs and carries oxygenated blood to the left atrium and

ventricle of the heart

B. CIRCLE OF WILLIS

The Circle of Willis 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 cerebrum.

C. SPLANCHNIC CIRCULATION

The splanchnic 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.

D. 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.

D. 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.

3. DISCUSS THE CARDIOVASCULAR ADJUSTMENT THAT OCCURS DURING EXERCISE

The cardiovascular system provides the link between pulmonary ventilation and oxygen usage at the cellular level. During exercise, efficient delivery of oxygen to working skeletal and cardiac muscles is vital for maintenance of ATP production by aerobic mechanisms. The equine cardiovascular response to increased demand for oxygen delivery during exercise contributes largely to the over 35-fold increases in oxygen uptake that occur during submaximal exercise. Cardiac output during exercise increases greatly owing to the relatively high heart rates that are achieved during exercise. Heart rate increases proportionately with workload until heart rates close to maximal are attained. It is remarkable that exercise heart rates six to seven times resting values are not associated with a fall in stroke volume, which is maintained by splenic contraction, increased venous return, and increased myocardial contractibility. Despite the great changes in cardiac output, increases in blood pressure during exercise are maintained within relatively smaller limits, as both pulmonary and systemic vascular resistance to blood flow is reduced. Redistribution of blood flow to the working muscles during exercise also contributes greatly to the efficient delivery of oxygen to sites of greatest need. Higher work rates and oxygen uptake at submaximal heart rates after training imply an adaptation due to training that enables more efficient oxygen delivery to working muscle. Such an adaptation could be in either blood flow or arteriovenous oxygen content difference. Cardiac output during submaximal exercise does not increase after training, but studies using high-speed treadmills and measurement of cardiac output at maximal heart rates may reveal improvements in maximal oxygen uptake due to increased stroke volumes, as occurs in humans. Improvements in hemoglobin concentrations in blood during exercise after training are recognized, but at maximal exercise, hypoxemia may reduce arterial oxygen content. More effective redistribution of cardiac output to muscles by increased capillarization and more efficient oxygen diffusion to cells may also be an important means of increasing oxygen uptake after training.