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COURSE: PHYSIOLOGY

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Discuss the long- term regulation of mean arterial blood pressure

Long – term regulation mainly involves the regulation of extracellular fluid volume by pressure natriuresis, mechanisms residing in the kidney and by widespread action of angiotensin.it 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).

Thus, it is impossible to change the long term mean arterial pressure level to a new value without changing one or both of the two basic determinants of long – term arterial pressure: either

1. The level of salt and water intake
2. The degree of shift of the renal function curve along the pressure axis.

However, if either of these is changed, one finds the arterial pressure thereafter to be regulated at a new pressure level, the arterial pressure at which the two curves intersect.

Mean arterial blood pressure = cardiac output- Total peripheral vascular resistance

CO – TPVR

Pulmonary circulation

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 to the heart. the pulmonary trunk splits into the right and left pulmonary arteries. These arteries transport the deoxygenated blood to the arterioles and capillary beds in the lungs. There carbon dioxide is released and oxygen is absorbed. oxygenated blood then passes from the capillary beds through venules into pulmonary veins.

Circle of Willis

The circle of Willis is the joining area of several arteries at the bottom side of the brain.it is also part of the cerebral circulation composed of left and right internal carotid artery and left and right posterior cerebral artery posterior communicating arteries (left and right)

Blood flow of the brain is supplied by four large arteries: two carotids and two vertebral arteries – they merge to form the circles of Willis at the back of the brain.

The arteries arising from circle of Willis travel along the brain surface and give rise to pial arteries, which branch out into smaller vessels called penetrating arteries and arterioles.

The penetrating vessels are separated slightly from the brain tissue by an extension of subarachnoid space. The penetrating vessels dive down into the brain tissue, giving rise to intracerebral arterioles, which eventually branch into capillaries where exchange among the blood and the tissues of oxygen, nutrients, carbon dioxide.

Splanchnic circulation

Splanchnic circulation includes blood flow through the spleens, and pancreas then flows immediately into the liver by way of the portal vein.

In the liver, the blood passes through millions of minute liver sinusoids and finally leaves the liver by the way of hepatic veins that empty into the vena cava, allows reticuloendothelial cells that line in the liver sinusoids to remove bacteria and other particulate matter that might enter the blood from gastrointestinal tract.

Coronary blood supply

Coronary arteries lie on the surface of the heart and smaller arteries then penetrate from the surface into the cardiac muscle mass. It's almost entirely these arteries that the heart receives its nutritive blood supply.

The left coronary artery supplies mainly the anterior and left lateral portions of the left ventricle.

The right coronary artery supplies most of the right ventricles as well as the posterior part of the left ventricle in 80 to 90 percent of people.

Most of the coronary venous blood flow from the left ventricular muscle returns to the right atrium of the heart by the way of the coronary sinus.

Cutaneous circulation

From its naming, It means the circulation and blood supply of the skin. Since 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.

Therefore, under normal conditions circulation to the skin makes up about 4% pf the total cardiac output. However cutaneous circulation plays an important role in regulation of core body temperature. Some of the circulating blood volume in the skin will flow through arteriovenous anastomoses (AVAs) instead of capillaries. Arteriovenous anastomoses serves a role in temperature regulation. Arteriovenous anastomoses are low resistance connections between the small arteries and small veins that supply and drains the skin.

Discuss the cardiovascular adjustment that occur in an exercise?

The three major cardiovascular adjustment that occur during an exercise includes: **one,** an increase in cardiac output or the pumping capacity of the heart, designed to enhance the delivery of oxygen and ensures an effective working muscle.

Two, increased muscles blood flow; blood vessel in the muscle dilate, increasing local blood flow and **Three**, decreased blood flow to kidneys, liver and gut; redirect or shunts blood flow to working muscles

During an exercise, increase in cardiac stroke volume and heart rate raise cardiac output, which coupled with a transient increase in systemic vascular resistance, elevate mean arterial blood pressure. Long term exercise can promote a net reduction in blood pressure at rest.