

NAME: AKIN-ADEWALE, AYOTOLA
MATRIC NUMBER: 19/MHS01/442
DEPARTMENT: MEDICINE AND SURGERY
DATE: 27TH JUNE, 2020_[Type here]

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

The long term regulation of mean arterial blood pressure.

Kidneys play an important role in the long term regulation of mean arterial blood pressure. When blood pressure alters slowly in several days/months/years. The nervous mechanism adapts to the altered pressure and loses sensitivity for changes. It cannot regulate the pressure anymore. In such conditions, the renal mechanisms operates efficiently to regulate blood pressure. Therefore it is called long term regulation.

Kidneys regulate arterial blood pressure by two ways:

- I. By regulation of ECF volume
- II. Through renin-angiotensin mechanism.

I. By regulation of extracellular fluid volume

When blood pressure decreases kidneys secrete large amounts of water and salt, particularly sodium, by means of pressure diuresis and pressure natriuresis. Pressure diuresis is the excretion of large quantity of water with urine because of increased blood pressure. Pressure natriuresis is the excretion of large quantity of sodium in urine.

Because of diuresis and natriuresis there is decrease in ECF volume and blood volume, which in turn brings the arterial blood pressure back to normal volume.

When the blood pressure decreases the reabsorption of water from the renal tubules increases. This in turn increases ECF volume, blood volume and cardiac output, resulting in the restoration of blood pressure.

II. Through renin- angiotensin mechanism

Action of angiotensin II

When blood pressure and ECF volume decrease renin secretion from the kidney is increased. It converts angiotensinogen into angiotensin I, this is converted into angiotensin II by ACE (angiotensin- converting enzyme).

Angiotensin II acts in two ways to restore blood pressure:

- i. It causes constriction of the arterioles in the body so the peripheral resistance is increased and blood pressure rises in addition, angiotensin II causes constriction of afferent arterioles in the kidney, so that the glomerular filtration reduces. This results in the retention of water and salts, increase ECF volume to the normal level. This in turn increase blood pressure to the normal level.
- ii. Simultaneously angiotensin II stimulates the adrenal cortex to secrete aldosterone, this hormone increase reabsorption of sodium from renal tubules, sodium reabsorption is followed by water reabsorption resulting in increased ECF volume and blood volume. It increases the blood pressure to normal level.

Actions of angiotensin III and angiotensin IV

Like angiotensin II, angiotensin III and IV also increase the blood pressure and stimulates the adrenal cortex to secrete aldosterone.

2. Write short notes on the following:

a) 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 of the heart.

b) Circle of Willis

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, and then the efferent venous blood flows into the PV. The PV and hepatic artery supply blood flow to the liver.

d) Coronary circulation

The 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.

e) Cutaneous circulation

Cutaneous circulation is the circulation and blood supply of the skin. The skin is not a very metabolically active tissue and has relative 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 arteriovenous anastomoses (AVAs) instead of capillaries. AVAs serve a role in temperature regulation.

3. Discuss the cardiovascular adjustment that occurs during exercise

During exercise, there is stimulation of the sympathetic fibers to stimulate the SA node, there is stimulation of the ventricle and this leads to:

- Increased cardiac contractility: which would lead to increased blood flow.
 - Increase in blood pressure.
 - Increase in stroke volume: this increases proportionally with exercise intensity.
 - increase in in cardiac output; this is as a result of increase in stroke volume
 - Increase in heart rate: is caused by release of epinephrine, the heart reate also
- this is known as anticipatory response

