ASSIGNMENT FOR VIVA..Radiology sec b 2nd semester

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Q1. (i) Write a note on cardiovascular system?

Ans: Cardiovascular System Summary.

The cardiovascular system includes:

The heart, a muscular pump

The blood, a fluid connective tissue

The blood vessels, arteries, veins and capillaries

Blood flows away from the heart in arteries, to the capillaries and back to the

heart in the veins

There is a decrease in blood pressure as the blood travels away from the heart

Arterial branches of the aorta supply oxygenated blood to all parts of the body

Deoxygenated blood leaves the organs in veins

Veins unite to form the vena cava which returns the blood to the hear

**Pulmonary system**

This is the route by which blood is circulated from the heart to the lungs and

back to the heart again

The pulmonary system is exceptional in that the pulmonary artery carries

deoxygenated blood and the pulmonary vein carries oxygenated bloodHepatic Portal Vein

There is another exception in the circulatory system – the hepatic portal vein

Veins normally carry blood from an organ back to the heart

The hepatic portal vein carries blood from the capillary bed of the intestine to

the capillary bed of the liver

As a result, the liver has three blood vessels associated with it

**Arteries and veins**

The central cavity of a blood vessel is called the lumen

The lumen is lined with a thin layer of cells called the endothelium

The composition of the vessel wall surrounding the endothelium is different in

arteries, veins and capillaries

Arteries carry blood away from the heart

Arteries have a thick middle layer of smooth muscle

They have an inner and outer layer of elastic fibres

Elastic fibres enable the artery wall to pulsate, stretch and recoil, thereby

accommodating the surge of blood after each contraction of the heart

Smooth muscle can contract or become relaxed

This contraction or relaxation brings about vasodilation or vasoconstriction to

control blood flow

During strenuous exercise the arterioles leading to the muscles undergo

vasodilation – the circular muscle in the arteriole wall is relaxed and the lumen is

wide

This allows an increased blood flow to the skeletal muscles

At the same time, the arterioles leading to the small intestine undergo

vasoconstriction

The circular muscles are contracted and the lumen is narrow

As a result, this reduces the blood flow to the gut

Veins carry blood back to the heart

The muscular layer and layers of elastic fibres in the vein wall are thinner than

those in an artery because blood flows along a vein at low pressure

The lumen of a vein is wider than that of an artery

Valves are present in veins, to prevent the backflow of blood

Following two slides compare an artery and vein

**Capillaries and exchange of gasses**

Blood is transported from arterioles to venules by passing through a dense

network of blood vessels called capillaries

All exchanges of substances between blood and living tissue takes place through

capillary walls

Capillary walls are composed of endothelium and are only one cell thick

Plasma is a watery yellow fluid containing dissolved substances such as glucose,

amino acids, blood cells, platelets and plasma proteins

Blood arriving at the arteriole end of a capillary bed is at a higher pressure than

blood in the capillaries

As blood is forced into the narrow capillaries, it undergoes pressure filtration

and much of the plasma is squeezed out through the thin walls

This liquid is called tissue fluid

The only difference between plasma and tissue fluid is that plasma has proteins

Tissue fluid contains a high concentration of dissolved food, oxygen, useful ions

etc.

These diffuse, down a concentration gradient, into the surrounding cells

Carbon dioxide and other metabolic wastes diffuse out of the cells, down a

concentration gradient, into the tissue fluid to be excreted

**Structures and functions of heart**

Continuous circulation of blood is maintained by a muscular pump, the heart

The heart is divided into 4 chambers, two atria and two ventricles

The right atrium receives deoxygenated blood from all parts of the body via the

vena cavae

Deoxygenated blood passes into the right ventricle before leaving the heart

through the pulmonary artery

The pulmonary artery divides into two branches, each leading to a lung

Oxygenated blood returns to the heart by the pulmonary veins

It flows from the left atrium to the left ventricle before leaving the heart by

the aorta

The wall of the left ventricle is more muscular and thicker than that of the

right ventricle

The left ventricle is required to pump blood all around the body

The right ventricle only pumps blood to the lungs

Valves between the atria and ventricles are the atrio-ventricular (AV) valves

Valves prevent the backflow of blood

The presence of valves ensures the blood flows in one direction through the

heart

Semi-lunar valves are present at the origins of the pulmonary artery and the

aorta

These valves open during ventricular contraction allowing flow into the arteries

When arterial pressure exceeds ventricular pressure, they close

**Cardiac function**

At each contraction the right ventricle pumps the same volume of blood through

the pulmonary artery as the left ventricle pumps through the aorta

Heart rate (pulse)

This is the number of heart beats per minute

Stroke volume

This is the volume expelled by each ventricle on contraction

Cardiac output is the volume of blood pumped out of a ventricle per minute

It is summarised by the following equation –

CO = HR X SV

HR is heart rate, SV is stroke volume

Pulse, health indicator

If a person is fit, the quantity of cardiac muscle present in their heart wall is

greater and more efficient than that of an unfit person

A very fit person tends to have a lower pulse rate than an unfit person – the fit

person’s heart is larger and stronger

A fit person’s stoke volume is greater

A fit person’s heart does not need to contract as often to pump an equal volume

of blood round the body

(ii) what are the symptoms of high and low blood pressure?

**Symptoms of high blood pressure**

Most diabetics with high blood pressure have no symptoms.

However, very high blood pressure or rapidly rising blood pressure can cause:

Headaches

Vision problems

Nose bleeds

Trouble breathing

Fits

Black-outs

**Symptoms of low blood pressure**

Similar to high blood pressure, the symptoms of low pressure may not always be apparent. If you do get symptoms, they may be identified as any of the following:

Feeling dizzy, light headed or fainting

Blurred vision

A rapid or irregular heartbeat

Feeling nauseous

Confusion

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(iii) what is the treatment of high and low blood pressure?

**Treatment of low blood pressure :**

For many people, chronic low blood pressure can be effectively treated with diet and lifestyle changes.

Depending on the cause of your symptoms, your doctor may tell you to increase your blood pressure by making these simple changes:

Eat a diet higher in salt.

Drink lots of nonalcoholic fluids.

Limit alcoholic beverages.

Drink more fluids during hot weather and while sick with a viral illness, such as a cold or the flu.

Have your doctor evaluate your prescription and over-the-counter medications to see if any of them are causing your symptoms.

Get regular exercise to promote blood flow.

Be careful when rising from lying down or sitting. To help improve circulation, pump your feet and ankles a few times before standing up. Then proceed slowly. When getting out of bed, sit upright on the edge of the bed for a few minutes before standing.

Elevate the head of your bed at night by placing bricks or blocks under the head of bed.

Avoid heavy lifting.

Avoid straining while on the toilet.

Avoid standing still in place for long periods of time.

Avoid prolonged exposure to hot water, such as hot showers and spas. If you get dizzy, sit down. It may be helpful to keep a chair or stool in the shower in case you need to sit; to help prevent injury, use a nonslip chair or stool designed for use in showers and bath tubs.

To avoid problems with low blood pressure and lessen episodes of dizziness after meals, try eating smaller, more frequent meals. Cut back on carbohydrates. Rest after eating. Avoid taking drugs to lower blood pressure before meals.

If needed, use elastic support (compression) stockings that cover the calf and thigh. These may help restrict blood flow to the legs, thus keeping more blood in the upper body.

**Treatment of high blood pressure :**

Treatment

Changing your lifestyle can go a long way toward controlling high blood pressure. Your doctor may recommend you make lifestyle changes including:

Eating a heart-healthy diet with less salt

Getting regular physical activity

Maintaining a healthy weight or losing weight if you're overweight or obese

Limiting the amount of alcohol you drink

But sometimes lifestyle changes aren't enough. In addition to diet and exercise, your doctor may recommend medication to lower your blood pressure.

Your blood pressure treatment goal depends on how healthy you are.

Your blood pressure treatment goal should be less than 130/80 mm Hg if:

You're a healthy adult age 65 or older

You're a healthy adult younger than age 65 with a 10 percent or higher risk of developing cardiovascular disease in the next 10 years

You have chronic kidney disease, diabetes or coronary artery disease

Although 120/80 mm Hg or lower is the ideal blood pressure goal, doctors are unsure if you need treatment (medications) to reach that level.

If you're age 65 or older, and use of medications produces lower systolic blood pressure (such as less than 130 mm Hg), your medications won't need to be changed unless they cause negative effects to your health or quality of life.