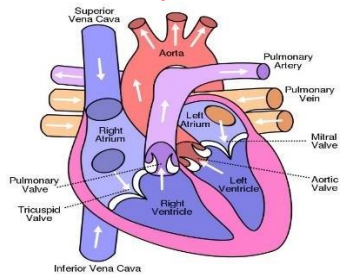


BTEC Sport Year 12-Unit 1 Learning aim D-The effects of exercise on the cardiovascular systemD1-Structure

D1- structure

What is the structure of the cardiovascular system?



What is the structure of blood vessels?

Arteries- Carry oxygenated blood away from the heart. Thick muscular walls. Carry blood at high pressure. 2 major properties-elasticity and contractility (to maintain blood pressure)
Arterioles- Thinner walls. Control blood distribution by changing their diameter. Adjust blood flow depending on how much oxygen is needed-wider during exercise
Capillaries- Connect arteries and veins. Smallest of all blood vessels. Walls are only one cell thick.
Veins- Venous return-the return of oxygen back to the heart. Blood flows slowly and under low pressure. Veins are close to the surface
Venules- Connect capillaries to the veins. Take blood from the capillaries and transport the deoxygenated blood under low pressure to the veins, which in turn will lead back to the heart.

What is blood made up of?

The average adult has 4-5 litres of blood. The blood is composed of:
Red blood cells- Main function is to carry oxygen. They carry haemoglobin which makes the blood red. Large surface area.
Plasma- Straw coloured liquid. Made of water, potassium, proteins and sodium Also carries carbon dioxide which is dissolved as carbonic acid.
White blood cells- Protect the body from infections. Identify, destroy and remove pathogens such as bacteria or viruses from the body Originate in the bone marrow and are stored in the blood
Platelets- Disc shaped fragments found in the bone marrow. Main function is clotting to prevent blood loss.

D2 and D3

What is the function of the cardiovascular system?

Delivering oxygen and nutrients
 Delivers more during exercise because your muscles need them to continue to work
 Fatigue happens when the cardiovascular system can no longer meet these demands
Removing waste products-carbon dioxide and lactate- Carries waste products from the tissues to the kidneys and liver. Returns carbon dioxide from the tissues to the lungs. More carbon dioxide and lactate are produced during exercise so it is essential these are removed, to avoid muscle fatigue.
Thermoregulation- Maintaining heat balance to ensure you do not overheat during exercise. Through vasodilation of blood vessels near the skin and vasoconstriction.
 Vasodilation -blood vessels become wider
 -blood vessels are carried to the surface of the skin
 -decrease in body temperature
 Vasoconstriction -blood vessels temporarily shut down
 -diameter of blood vessels decrease
 -increase in body temperature
Fighting infection- By the white blood cells
Clotting blood- Damaged blood vessels cover themselves in fibrin to help repair themselves and platelets form a scab

What is nervous control of the cardiac cycle?

Happens due to the electrical system of the heart
Sinoatrial node (SAN)

- Also known as the heart's pacemaker
- Found in the wall of the right atrium
- Sends a signal from the right atrium, causing the walls to contract

Atrioventricular node (AVN)

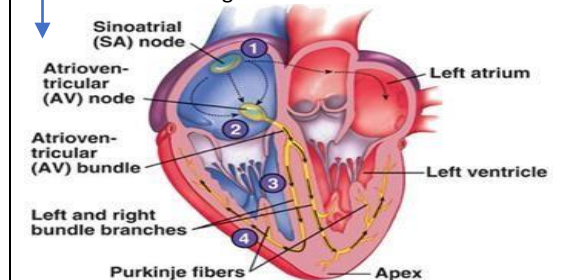
- Found in the centre of the heart
- Slows down the signal from SAN
- Allows the atria to contract before the ventricles, meaning the atria are open and ready to receive blood

Bundle of His and Purkinje fibres

- Specialist heart muscle cells
- Transport electrical impulses from AVN
- Found in the walls of the ventricles and septum
- Filaments allow the ventricles to contract at a paced interval

What is the effect of the parasympathetic and sympathetic nervous system?

- Regulates breathing and heart beating and is involuntary
- Sympathetic-prepares the body for intense physical activity. Causes the heart to beat faster and lungs to work harder to produce more energy
- Parasympathetic-relaxes the body-allows the heart to return to resting after exercise.



D4 to D6

What are the responses of the cardiovascular system to a single exercise session?

Anticipatory increase- increase heart rate prior to exercise
Increased heart rate
Increased cardiac output- The amount of blood pumped out of the left side of the heart in one minute. **Cardiac output = heart rate x stroke volume**
 Increased blood pressure- (pressure of the blood against the walls of the arteries)
Systolic pressure-the pressure on the artery walls when your heart contracts and forces blood out of the heart
Diastolic pressure-pressure on the blood vessel walls when the heart is relaxed and filling with blood
Redirection of blood flow

What are the long-term effects of exercise on the cardiovascular system?

Cardiac hypertrophy-heart gets bigger and stronger
 Increase in resting and exercising stroke volume (the amount of blood pushed out of the heart in one beat)
 Decrease in resting heart rate
 Reduction in resting blood pressure
 Decreased heart rate recovery time
 Capillarisation of skeletal muscle and alveoli
 Increase in blood volume

What other factors can affect the cardiovascular system?

Sudden arrhythmic death syndrome (SADS)-
 Heart condition
 Sudden death in young, healthy people e.g.
 Fabrice Muamba (Bolton FC)

 High (hypertension) and low (hypotension) blood pressure
 Hyperthermia/hypothermia