# AQA Biology GCSE

## 2.2 - Animal Tissues, Organs and Systems

Flashcards

# What is the main function of the digestive system?

What is the main function of the digestive system?

To digest food and absorb the nutrients obtained from digestion.

What is the role of the pancreas and the salivary gland in the digestive system?

# What is the role of the pancreas and the salivary gland in the digestive system?

The pancreas and the salivary gland are glands which produce digestive juices containing enzymes.

# What is the role of the stomach in the digestive system?

# What is the role of the stomach in the digestive system?

Produces hydrochloric acid - which kills any bacteria present and provides the optimum acidic pH for the protease enzyme to function.

# What is the role of the small intestine in the digestive system?

# What is the role of the small intestine in the digestive system?

The small intestine is the site where soluble food molecules are absorbed into the bloodstream.

# What is the role of the liver in the digestive system?

# What is the role of the liver in the digestive system?

Produces bile (stored in the gallbladder) which emulsifies lipids and allows the lipase enzyme to work more efficiently.

# What is the role of the large intestine in the digestive system?

What is the role of the large intestine in the digestive system?

Absorbs water from undigested food, producing faeces.

# What is the role of enzymes in the digestive system?

# What is the role of enzymes in the digestive system?

Enzymes act as biological catalysts which speed up the rate of biological reactions (the breakdown of food) without being used up.

# How does the shape of an enzyme affect its function?

# How does the shape of an enzyme affect its function?

Enzymes have a specific active site which is complementary to their substrate.

# What is metabolism?

# What is metabolism?

The sum of all the reactions in a cell or an organism.

# What types of metabolic reactions do enzymes catalyse?

# What types of metabolic reactions do enzymes catalyse?

- Building larger molecules from smaller molecules eg. glucose to starch.
- Changing one molecule to another eg. glucose to fructose.
- Breaking down larger molecules into smaller molecules eg. carbohydrates to glucose.

# What is the lock and key hypothesis of enzyme function?

# What is the lock and key hypothesis of enzyme function?

The shape of the enzyme active site and the substrate are complementary, so can bind together to form an enzyme-substrate complex.

# How does temperature affect enzyme action?

# How does temperature affect enzyme action?

Up to a certain point, increasing temperature increases enzyme action, as molecules have a higher kinetic energy. Above a certain temperature, the shape of the active site is altered and the enzyme becomes denatured, so it can no longer catalyse the reaction. The optimum temperature is around 37°.

# How does pH affect enzyme function?

# How does pH affect enzyme function?

The optimum pH for most enzymes is 7 (apart from proteases in the stomach). If the pH is too extreme, the shape of the active site may be altered and the enzyme may no longer work.

# Where are carbohydrases, proteases and lipases produced in the body?

# Where are carbohydrases, proteases and lipases produced in the body?

- Carbohydrases: amylase - salivary gland and pancreas; maltase - small intestine.
- Proteases: pepsin - stomach; others - pancreas and small intestine.
- Lipases: pancreas and small intestine.

# What is the role of carbohydrases in the digestive system?

# What is the role of carbohydrases in the digestive system?

Carbohydrases break down carbohydrates into monosaccharides and disaccharides. Amylase breaks down starch into maltose, and maltase breaks down maltose into glucose.

# What is the role of proteases in the digestive system?

# What is the role of proteases in the digestive system?

Proteases break down proteins into amino acids.

# What is the role of lipases in the digestive system?

# What is the role of lipases in the digestive system?

Lipases break down lipids into fatty acids and glycerol.

# How are the products of digestion used?

# How are the products of digestion used?

They are used to build bigger molecules such as carbohydrates and proteins. Glucose is used as a substrate in respiration.

# Where is bile made and stored in the body?

# Where is bile made and stored in the body?

Bile is made by the liver and stored in the gallbladder

# What is the role of bile in the digestive system?

# What is the role of bile in the digestive system?

- Bile is an alkaline substance which neutralises the hydrochloric acid secreted by the stomach.
- Bile emulsifies lipids to form droplets - this increases the surface area for the lipase enzyme to work on.

# What is the heart?

# What is the heart?

An organ that pumps blood around the body

# What is the purpose of the circulatory system?

# What is the purpose of the circulatory system?

Carries oxygen and other useful substances to bodily tissues, and removes waste substances.

# How does the double circulatory system work?

# How does the double circulatory system work?

- One pathway carries blood from the heart to the lungs - where the gaseous exchange of oxygen and carbon dioxide takes place.
- One pathway carries blood from the heart to the tissues.

# Where does blood pumped by the right ventricle go?

# Where does blood pumped by the right ventricle go?

The lungs

# Where does blood pumped by the left ventricle go?

# Where does blood pumped by the left ventricle go?

Body tissues

# Why is the double circulatory system important?

# Why is the double circulatory system important?

It makes the circulatory system more efficient - for example, oxygenated blood can be pumped around the body at a higher pressure by the left ventricle.

How many chambers does the heart have and what are they called?

How many chambers does the heart have and what are they called?

4 - right atrium, right ventricle, left atrium, left ventricle.

# Why is the wall of the left ventricle thicker?

# Why is the wall of the left ventricle thicker?

The left ventricle has to pump blood at a higher pressure around the whole body.

# What are the four main blood vessels associated with the heart?

# What are the four main blood vessels associated with the heart?

- Aorta (left) - carries oxygenated blood from the heart to the body.
- Pulmonary vein (left) - carries oxygenated blood from the lungs to the heart.
- Vena cava (right) - carries deoxygenated blood from the body to the heart.
- Pulmonary artery (right) - carries deoxygenated blood from the heart to the lungs.

# What is the purpose of valves in the heart?

# What is the purpose of valves in the heart?

Prevent the backflow of blood

# What is the purpose of coronary arteries?

# What is the purpose of coronary arteries?

Coronary arteries supply the heart muscle with oxygenated blood.

# Describe the process of blood flow through the heart

# Describe the process of blood flow through the heart

- Blood enters the right atrium via the vena cava, and the left atrium via the pulmonary vein.
- The atria contract, forcing blood into the ventricles and causing valves to shut.
- After the ventricles contract, blood in the right ventricle enters the pulmonary artery (to the lungs) and blood in the left ventricle enters the aorta (to the body).

# What is the approximate value of the natural resting heart rate?

What is the approximate value of the natural resting heart rate?

70 beats per minute

# How is the heart rate controlled?

# How is the heart rate controlled?

Heart rate is controlled by a group of cells in the right atrium which act as a pacemaker. They release waves of electrical activity which cause the heart muscle to contract.

# How can an abnormal heart rhythm be treated?

# How can an abnormal heart rhythm be treated?

Irregular heart rhythms can be treated using an artificial pacemaker, which sends out electrical signals to correct the heart's rhythm.

# What are the three types of blood vessel in the body?

# What are the three types of blood vessel in the body?

- Arteries
- Veins
- Capillaries

# How are arteries adapted for their function?

# How are arteries adapted for their function?

- Function: carry blood away from the heart.
- Thick muscle layer - adds strength to resist high pressure.
- Thick elastic layer - allows arteries to stretch and recoil - in order to withstand high pressure.

# How are veins adapted for their function?

# How are veins adapted for their function?

- Function: carry blood towards the heart
- Wide lumen - enables low pressure
- Valves - prevent backflow of blood

# How are capillaries adapted for their function?

# How are capillaries adapted for their function?

- Function: enable transfer of substances between the blood and tissues.
- Walls are one cell thick - short diffusion path.
- Permeable walls - substances can diffuse across.
- Narrow lumen - blood moves slowly - more time for diffusion.

How would you calculate the rate of blood flow?

# How would you calculate the rate of blood flow?

Volume of blood / number of minutes

# Where are the lungs found in the body?

# Where are the lungs found in the body?

The lungs are located in the thorax (within the chest). They are protected by the ribcage and separated from the rest of the abdomen by the diaphragm.

# What tissues and organs make up the gas exchange system?

# What tissues make up the gas exchange system?

- Trachea
- Intercostal muscles
- Bronchi
- Bronchioles
- Alveoli
- Diaphragm

# Explain how the lungs are ventilated by the action of intercostal muscles

# Explain how the lungs are ventilated by the action of intercostal muscles

- Intercostal muscles contract
- Ribcage moves upwards and outwards
- Diaphragm flattens and volume of the chest increases
- Increased volume results in decreased pressure
- Air is drawn into lungs down pressure gradient

The inverse occurs when air moves out of the lungs.

# Describe how gas exchange occurs at the alveoli

# Describe how gas exchange occurs at the alveoli

- Oxygen diffuses from the alveoli into the capillary bloodstream down its concentration gradient.
- Carbon dioxide diffuses from the capillary into the alveoli down its concentration gradient.

# Describe how alveoli are adapted for gas exchange

# Describe how alveoli are adapted for gas exchange

- Small and arranged in clusters - larger surface area.
- Rich blood supply - maintains concentration gradient.
- Thin alveolar wall - short diffusion pathway.

How would you calculate the breathing rate

# How would you calculate the breathing rate

Number of breaths / number of minutes

What substance carries the different components of blood around the body?

What substance carries the different components of blood around the body?

Plasma

# What substances are transported by plasma?

# What substances are transported by plasma?

- Red blood cells
- White blood cells
- Platelets
- Carbon dioxide
- Urea
- Products of digestion

# What is plasma?

# What is plasma?

A yellow liquid within blood that transports substances around the body.

# What is the purpose of red blood cells in blood?

# What is the purpose of red blood cells in blood?

Transport of oxygen around the body

# How are red blood cells adapted for their function?

# How are red blood cells adapted for their function?

- Biconcave shape - increased surface area to volume ratio.
- No nucleus - more room for haemoglobin to bind to oxygen.
- Contain haemoglobin - binds to oxygen.

# What is the purpose of white blood cells in blood?

What is the purpose of white blood cells in blood?

They form part of the immune system, which protects the body from invading pathogens.

# How are white blood cells adapted for their function?

# How are white blood cells adapted for their function?

- Have a nucleus - contains DNA which codes for proteins
- Can produce antibodies
- Can produce antitoxins
- Can engulf and digest pathogens (phagocytosis)

# What is the purpose of platelets in blood?

# What is the purpose of platelets in blood?

Platelets are small cell fragments which aid the clotting of blood at the site of a wound.

# Why is the function of platelets important?

# Why is the function of platelets important?

- Platelets aid in the process of blood clotting (conversion of fibrinogen to fibrin). As a result, red blood cells are trapped in the fibrin network, forming a clot which prevents excessive bleeding. Scab formation (after the clot has dried) prevents bacteria from entering the wound.

# What is coronary heart disease?

# What is coronary heart disease?

Coronary heart disease occurs when the coronary arteries that supply the heart muscle become blocked with a buildup of fatty material. This restricts the supply of oxygen to the heart, possibly leading to a heart attack or death.

# What is a stent and how does it work?

# What is a stent and how does it work?

A stent is a metal mesh tube that is inserted into a blocked artery so that it remains open. The stent is inflated using a balloon, which is later removed to allow blood to flow freely.

# What are the advantages and disadvantages of stents?

# What are the advantages and disadvantages of stents?

## Advantages

- Insertion can be carried out without general anaesthetic
- Quick recovery time
- Lower the risk of a heart attack

## Disadvantages

- Risk of postoperative infection
- Risk of blood clots at site of stent

# What are statins?

# What are statins?

Statins are drugs which reduce the level of LDL (bad) cholesterol which contributes to the development of coronary heart disease.

# What are the advantages and disadvantages of statins?

# What are the advantages and disadvantages of statins?

## Advantages

- Reduce risk of strokes, coronary heart disease and heart attacks
- Increase level of HDL (good) cholesterol

## Disadvantages

- Have to be taken continuously
- May have side effects
- Effect may not be immediate

# What is a heart bypass surgery?

# What is a heart bypass surgery?

A surgery where blocked coronary arteries are replaced with sections of veins taken from other parts of the body.

# What are the consequences of leaky heart valves?

# What are the consequences of leaky heart valves?

Blood flows in the wrong direction, causing the heart to become less efficient. Patients may become breathless and die as a result.

# What types of valves can replace leaky valves?

# What types of valves can replace leaky valves?

- Mechanical - made of metal or polymers
- Biological - taken from animals (pigs, sometimes humans)

# What are the advantages and disadvantages of mechanical valves?

# What are the advantages and disadvantages of mechanical valves?

## Advantages

- Last for a very long time

## Disadvantages

- Need to take medication to prevent blood clotting around valve

# What are the advantages and disadvantages of biological valves?

# What are the advantages and disadvantages of biological valves?

## Advantages

- Work very well - no medication required

## Disadvantages

- Only lasts 12-15 years

# What is the purpose of an artificial heart?

# What is the purpose of an artificial heart?

Artificial hearts are intended to support a patient's heart while they wait for a suitable donor heart.

# What are the advantages and disadvantages of artificial hearts?

# What are the advantages and disadvantages of artificial hearts?

## Advantages

- Less likely to be rejected by immune system
- Allows damaged heart to rest to help recovery

## Disadvantages

- Risk of infection due to surgery
- Risk of blood clots
- Have to take blood-thinning drugs

# What is health?

# What is health?

Health is the state of physical and mental wellbeing

# What is a communicable disease?

# What is a communicable disease?

A disease caused by a pathogen which can be transmitted from one person to another eg. the flu.

# What is a non-communicable disease?

# What is a non-communicable disease?

A disease which can not be transmitted from person to person eg. cancer.

# How can diet affect health?

# How can diet affect health?

- Too little food / lack of nutrition - anaemia, vitamin deficiencies.
- Too much food / too much unhealthy food - obesity, type 2 diabetes.

# How can stress affect health?

# How can stress affect health?

Prolonged stress is linked to a wide range of health problems including heart diseases, cancers and mental health issues.

# How can life situations affect health?

# How can life situations affect health?

Many life factors such as location, gender, financial status, ethnic group and healthcare provision can impact a person's mental and physical health.

# Give examples of how health problems can interact

# Give examples of how health problems can interact

- Infection with certain viruses can lead to cancer eg. hepatitis infections can lead to liver cancer.
- A compromised immune system (eg. due to cancer) can lead to a higher risk of infection with communicable diseases.
- Immune reactions caused by a pathogen can trigger allergic reactions.
- Problems with physical health can lead to mental health issues.

# What is a risk factor?

# What is a risk factor?

A risk factor is an aspect of a person's lifestyle or a substance found in the body or the environment which can increase the risk of a disease.

# What is a causal mechanism?

# What is a causal mechanism?

A mechanism which demonstrates how one factor biologically influences another.

# How do diet, smoking and exercise affect the development of cardiovascular disease?

# How do diet, smoking and exercise affect the development of cardiovascular disease?

- Diet: high levels of LDL cholesterol causes arteries to become blocked, increasing blood pressure and the risk of a heart attack.
- Smoking: nicotine increases heart rate; other chemicals damage the artery lining and increase blood pressure.
- Exercise: lowers blood pressure, reducing strain on the heart.

# How does obesity affect the development of Type 2 diabetes?

# How does obesity affect the development of type 2 diabetes?

- Obesity is strongly linked with the onset of type 2 diabetes - a disease in which the body stops responding to insulin.

# How does alcohol affect liver and brain function?

# How does alcohol affect liver and brain function?

- Excessive long-term alcohol use may lead to liver cirrhosis (scarring of the liver).
- Increases risk of liver cancer.
- Damages brain tissue and nerve cells.

# How does smoking affect the development of lung disease and lung cancer?

# How does smoking affect the development of lung disease and lung cancer?

- Tar in tobacco can damage the alveoli of the lungs, leading to chronic obstructive pulmonary disease (COPD).
- Tar also damages the cells which line the lungs, leading to lung cancer.

# How do smoking and alcohol affect unborn babies?

# How do smoking and alcohol affect unborn babies?

- Carbon monoxide from tobacco smoke reduces the amount of oxygen the foetus receives, which can lead to premature birth or stillbirth.
- Alcohol passes across the placenta and damages the developing foetus. Once born, the baby may have a number of deformities and health problems as part of foetal alcohol syndrome.

# How do carcinogens affect the development of cancer?

# How do carcinogens affect the development of cancer?

Ionising radiation is a type of carcinogen which can cause mutations in DNA, potentially leading to cancer.

# What is cancer?

# What is cancer?

Cancer is the development of a tumour as a result of uncontrolled cell division.

# What is a benign tumour?

# What is a benign tumour?

- A tumour that is contained in one location, usually within a membrane.
- They are not cancerous and do not invade other parts of the body.
- Can grow large very quickly - may cause damage to another organ.

# What is a malignant tumour?

# What is a malignant tumour?

- A tumour that can spread around the body via the blood and lymphatic system.
- Can invade other tissues (metastasis).
- Cells divide more rapidly and have a longer lifespan.
- Disrupts healthy tissues and may lead to death.

# Give examples of factors which can lead to cancer

# Give examples of factors which can lead to cancer

- Genetics - certain genes increase the risk of breast and ovarian cancer
- Smoking
- Obesity
- Ionising radiation - UV light and X-rays
- Viral infections - HPV and cervical cancer