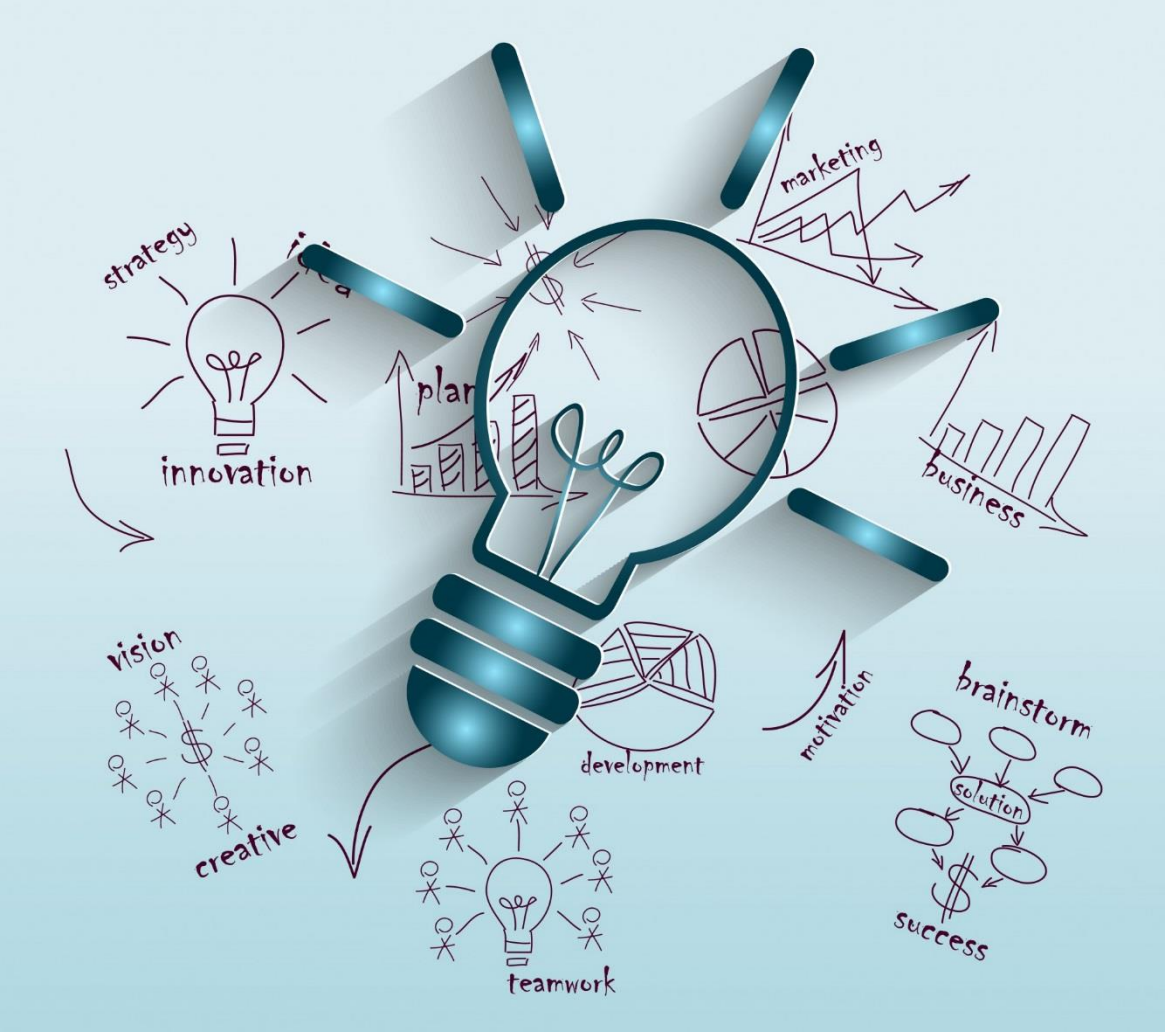
Knowledge book



Health and Social Care – Cambridge Technicals

Unit 4 – Anatomy and physiology for health and social care

The table below shows all the topics you will cover.

Learning outcomes	What you must know
1. Understand the cardiovascular system, malfunctions and their impact on individuals	**Composition of blood** ✓ Erythrocytes ✓ Lymphocytes ✓ Neutrophils ✓ Monocytes ✓ Platelets ✓ plasma **Functions of blood** ✓ transport ✓ temperature regulation ✓ exchange of materials with body tissues ✓ preventing infection ✓ blood clotting **Structure of heart** ✓ atria ✓ ventricles ✓ vena cava ✓ pulmonary arteries and veins ✓ aorta ✓ tricuspid and bicuspid valves ✓ semi-lunar valves ✓ coronary arteries **Function of heart** ✓ double pump ✓ diastole ✓ systole ✓ cardiac cycle ✓ role of component parts **Control and regulation of cardiac cycle** ✓ location and role of SA and AV nodes ✓ Purkyne fibres

	✓ ECG trace **Types, structure and functions of blood vessels** ✓ Arteries ✓ Veins ✓ Capillaries **Formation of tissue fluid and lymph** ✓ Role of hydrostatic pressure ✓ Blood proteins ✓ Structure and role of lymphatic system **Cardiovascular malfunctions – possible causes and symptoms** ✓ Hypertension ✓ Coronary heart disease **Monitoring, treatment and care needs for cardiovascular malfunctions**
2.Understand the respiratory system, malfunctions and their impact on individuals	**Structure of respiratory system** ✓ Larynx ✓ Trachea ✓ Bronchi ✓ Bronchioles ✓ Alveoli ✓ Diaphragm ✓ Intercostal muscles ✓ Pleural membranes **Inspiration and expiration** ✓ Role of pleural membranes ✓ Role of diaphragm ✓ Role of intercostal muscles **Gaseous exchange** ✓ Role and structure of alveoli walls ✓ Diffusion gradients ✓ Erythrocytes ✓ plasma **Cellular respiration** ✓ Role of glucose

	✓ Oxygen ✓ Function of ATP ✓ Aerobic/anaerobic respiration ✓ Production of carbon dioxide ✓ Production of lactic acid ✓ Production of ATP **Respiratory malfunctions – possible causes and effects** ✓ Asthma ✓ Emphysema ✓ Cystic fibrosis **Monitoring, treatment and care needs for respiratory malfunctions**
3.Understand the digestive system, malfunctions and their impact on individuals	**Gross structure of digestive system and functions of component parts** ✓ Buccal cavity ✓ Salivary glands ✓ Epiglottis ✓ Oesophagus ✓ Stomach ✓ Small intestine ✓ Large intestine ✓ Rectum ✓ Anus ✓ Liver ✓ Gallbladder ✓ Bile duct ✓ Pancreas ✓ Pancreatic duct **Mechanical and chemical digestion** ✓ Action of chewing ✓ Action of stomach ✓ Action of digestive enzymes in stomach and small intestine **Digestive roles of liver and pancreas** ✓ Digestive role of pancreatic juice ✓ Digestive role of bile **Absorption and assimilation**

	✓ Adaptations of intestine wall for absorption ✓ Liver's role in assimilation **Digestive malfunctions – possible causes and effects** ✓ Irritable Bowel Syndrome ✓ Gallstones ✓ Coeliac disease **Monitoring, treatment and care needs for digestive malfunctions**
4.Understand the musculoskeletal system, malfunctions and their impact on individuals	**Structure of bone** ✓ Vertical and transverse sections **Types of joints** ✓ Ball and socket ✓ Pivot ✓ Hinge ✓ Sliding ✓ Fixed **Components of a synovial joint** ✓ Muscle ✓ Bone ✓ Ligament ✓ Tendon ✓ Cartilage ✓ Synovial capsule ✓ Synovial fluid **Muscle action around a joint** ✓ Antagonistic action of skeletal muscle ✓ Contraction ✓ Relaxation ✓ Role of tendons **Musculoskeletal malfunctions – possible causes and effects** ✓ Arthritis ✓ Osteoporosis **Monitoring, treatment and care needs for musculoskeletal malfunctions**

5.Understand the control and regulatory systems, malfunctions and their impact on individuals	**Components of nerve systems** ✓ Central nervous system ✓ Peripheral nerves ✓ Autonomic system ✓ Spinal cord ✓ Sensory and motor neurons **Structure and function of brain** ✓ Cerebral cortex ✓ Cerebellum ✓ Frontal lobes ✓ Corpus callosum ✓ Hypothalamus ✓ Medulla ✓ Meninges **Nerve action** ✓ Structure of neuron ✓ Role of axon/Dendron ✓ Myelin sheath ✓ Synapse **Organisation and function of endocrine system** ✓ Pancreas ✓ Pituitary ✓ Adrenal glands ✓ Thyroid ✓ Hormones **Structure of kidney** ✓ Cortex ✓ Medulla ✓ Calyx ✓ Ureters ✓ Renal artery/vein ✓ Urethra ✓ Bladder, kidney nephron **Functions of kidney** ✓ Removal of urea, regulation of water levels, ultrafiltration,

	reabsorption, osmoregulation, parts of nephron involved **Breakdown functions of liver** ✓ Deamination, detoxification, production of bile **The concept of homeostasis** ✓ Principle of homeostasis and its importance **Malfunctions of control and regulatory systems – possible causes and effects** ✓ Brain ✓ CNS ✓ Endocrine ✓ Kidney ✓ Liver **Monitoring, treatment and care needs for malfunctions of control and regulatory systems**
6.Understand the sensory systems, malfunctions and their impact on individuals	**Structure of the eye** ✓ Pupil ✓ Iris ✓ Tear glands ✓ Humours or fluids ✓ Conjunctive ✓ Cornea ✓ Retina ✓ Macula ✓ Optic nerve ✓ Ciliary muscle/suspensory ligaments ✓ lens **Structure of the ear** ✓ external ✓ middle ✓ inner ear ✓ eardrum ✓ stapes/incus/malleus ear bones

	✓ cochlea ✓ organ of Corti ✓ Eustachian tube ✓ Round window ✓ Auditory nerve ✓ Semi-circular canals ✓ Ampullae **Malfunctions of eye and ear – possible causes and effects** ✓ Eye – glaucoma, AMD, cataracts, retinopathy ✓ Ear – deafness **Monitoring, treatment and care needs for malfunctions of the eye and the ear**

Key terms

Angiogram	A type of x-ray that involves a dye visible in x-ray photographs that is injected into the blood system so that narrowing of coronary arteries can be seen
Angioplasty	A microscopic deflated balloon is passed into a narrowed artery and inflated, pushing the artery open. Sometimes a microscopic mesh tube or stent is inserted at the same time, keeping the artery open for longer
Coronary bypass	Using a piece of artery from the chest to bypass or bridge a blocked region of coronary artery, allowing blood to flow beyond the blockage
Peak flow	The rate of expired air, measured on a hand-held device
Inhaler	A method of getting medication directly into the lungs. May be pressurised. Two types – relievers (blue) that dilate the bronchi during an

	attack and preventers (red, brown or orange) that reduce sensitivity and inflammation of the bronchi
Nebuliser	A mouthpiece or facemask that introduces medication to the lungs as a fine spray
Spirometer	Equipment that measures the volume of the lungs and how much air can be exchanged per breath
Ultrasound	Using high frequency sound to generate internal images of structures within the body. Echoes from the objects are interpreted by a computer
Lithotripsy	Using high-frequency sound waves to vibrate apart solid objects like all stones
Endoscopy	Inserting a microscopic light source and video camera at the end of a long flexible tube through either end of the gut. Images are relayed to a screen
Biopsy	A sample of tissue that is taken from the body for examination under a microscope
HRT (hormone replacement therapy)	Prescribing the hormones oestrogen and/or progesterone to post-menopausal women. There is some evidence increased risk of strokes, blood clots and certain cancers
Diuretics	Drugs that flush out excess water from the body by increasing urination
Steroids	Drugs used to reduce inflammation brought about by overactive immune systems
Immune-suppressants	Medication that suppresses the types of white blood cell involved in rejection, slowing down or preventing the destruction of the donated organ. Also

	suppresses the response to viruses and cancers
Dialysis	Devices used to clean the blood of impurities such as urea
Hearing aid	Small digital or analogue amplification device worn in or behind the ear(s) to magnify sounds
Cochlear implant	A small electrical device that detects sounds and sends impulses to the brain

Learning outcome 1: Understand the cardiovascular system, malfunctions and their impact on individuals

Composition of blood (What blood is made of)

Erythrocytes – these are red blood cells that carry oxygen and some carbon dioxide

Lymphocytes – this is a type of white blood cell, it destroys viruses and cancer cells

Neutrophils – this is a type of white cell, produce antibodies to fight infection

Monocytes – this is a type of white blood cell, remove dead cells and bacteria

Platelets – triggers blood clotting

Plasma – this is a yellow liquid which makes up 55 per cent of the blood. It is made up of mostly water

Functions of blood (What does the blood do in the body)

Transport – nutrients from digestive system to tissues or storage areas like the liver.

Blood proteins – Lipoproteins carry fats. LDL (low density lipoprotein) deposits fat and cholesterol in the arteries, HDL (high density lipoprotein) does not and collects the deposits of fat and cholesterol

Temperature regulation – blood circulates heat around the body and removes heat from the body.

Exchange of materials with body tissues – capillaries supply the tissues with oxygen and nutrients and remove waste products

Preventing infection – the immune system produces antibodies to fight infections. White blood cells are involved in the immune response
Blood clotting – if blood is exposed to the air, platelets make the blood coagulate and forms a scab over the damaged area

Structure of heart.
Atria – the two top chambers in the heart which blood is passed to the ventricles. The right atrium receives deoxygenated blood from the veins of the body, the left atrium oxygenated blood to the pulmonary vein
Ventricles – two bottom chambers of the heart which collect blood from the lungs and body
Vena cava – there are two vena cava's one is the inferior which brings deoxygenated blood back to the heart from the lower body, the other is the superior which brings deoxygenated blood back to the heart from the lower body
Pulmonary arteries – takes deoxygenated blood to the lungs from the heart
Pulmonary vein – takes blood with oxygen to the heart from the lungs
Aorta –distributes blood with oxygen to all parts of the body
Tricuspid and bicuspid valves – one way valves between the atria and the ventricles and to prevent back flow of blood
Semi-lunar valves – one way valves to allow blood to leave the heart and prevent back flow
Coronary arteries – these supply oxygen-rich blood to the entire heart muscle

Function of heart
Double pump – your heart is a single organ, but acts as a double pump. The first pump carries oxygen-poor blood to your lungs, where it uploads carbon dioxide and picks up oxygen. It then delivers oxygen-rich blood back to your heart. The second pump delivers oxygen-rich blood to every part of your body

Diastole – when the heart muscle relaxes and allows the chambers to fill with blood
Systole – ventricles are contracting to pump blood to the body and the lungs
Cardiac cycle – co-ordinated flow of blood through the heart. It includes the phase of relaxation diastole and the contraction systole

Control and regulation of cardiac cycle
Location and role of SA and AV nodes – the sinoatrial (SA) node is located in the right atrium of your heart, the atrioventricular (AV) node is located in the interatrial septum close to the tricuspid valve. The way the electric current passes through the heart to make the atria and ventricles contract
Purkyne fibres – carry the current down to the ventricles so they contract
ECG trace (P, Q, R, S and T waves/spikes) – method of monitoring the cardiac cycle

Types, structure and functions of blood vessels
Arteries – carry blood with oxygen away from the heart. Apart from pulmonary artery which carries blood without oxygen from the heart to the lungs.
Veins – carry blood without oxygen to the heart. Apart from the pulmonary vein which carries blood with oxygen from the lungs to the heart.
Capillaries – microscopic tubes that carry blood with oxygen from the arteries to the tissues and then collects the waste products from the tissues and passes this blood to the veins to go back to the heart

Formation of tissue fluid and lymph

Role of hydrostatic pressure – pushes water out of the capillaries into the tissue cells. Osmosis makes the water go back into the capillaries
Blood proteins – are present in blood plasma. They have many different functions including transport of lipids, hormones, vitamins and minerals in the circulatory system and the functioning of the immune system
Structure and role of lymphatic system – it is a network of tubes throughout the body the drain fluid from tissues and empties it back into the bloodstream. The main roles of the lymphatic system include managing the fluid levels in the body, filtering out bacteria, and housing types of white blood cells.

Cardiovascular malfunctions – possible causes and symptoms
Hypertension – blood pressure. Low blood pressure leads to dizziness and fainting. High blood pressure leads to a greater risk of stroke, heart attacks and kidney damage
Coronary heart disease (e.g. angina, heart attack) – arteries become unhealthy and clog up with fat and cholesterol. White blood cells attack the deposits and then die reducing the space inside and restricting the flow of blood to the heart. Angina is pain in the heart caused by the cells not having enough oxygen. If the artery becomes completely blocked and is not treated this could cause a heart attack.

Monitoring, treatment and care needs for cardiovascular malfunctions (e.g. impact on lifestyle changes, medication, blood pressure readings, ECG traces, coronary bypass)

Learning outcome 2: Understand the respiratory system, malfunctions and their impact on individuals

Structure of respiratory system

Larynx – the hollow muscular organ forming an air passage to the lungs and holds the vocal cords, known as the voice box

Trachea – also known as the windpipe, leads from the back of the throat to the lungs allowing air to pass through

Bronchi – the trachea splits into two bronchi which form the main passageway into the lungs

Bronchioles – as the bronchi get nearer to the lungs they become narrower forming bronchioles

Alveoli – are tiny sacs within our lungs that allow oxygen and carbon dioxide to move between the lungs and bloodstream

Diaphragm – is the primary muscle used in the process of inspiration, or inhalation. It is located in the lower ribs. The work of breathing is done by the diaphragm.

Intercostal muscles – muscles between the ribs.

Pleural membranes – these are crucial to the inflating and deflating as well as preventing friction as the lungs move. If the space between the membranes is punctured, the lung on that side will not inflate.

Inspiration and expiration – the process of breathing in and out

Role of pleural membranes – these are crucial to the inflating and deflating as well as preventing friction as the lungs move.

Role of diaphragm – the diaphragm recoils upwards into its domed position and gravity causes the ribcage to drop back and downwards

Role of intercostal muscles – They contract to pull the ribcage back down with more force

Gaseous exchange – the site of gaseous exchange is in the alveoli

Role and structure of alveoli walls – their vast number with the capillaries that are surrounding make up a large surface area, helping a larger amount of gaseous exchange to take place. The walls are very thin which means gasses can move back and forward easier. The walls are covered with a thin layer of water allowing oxygen to dissolve before being lost

Diffusion gradients – when there is a higher amount of oxygen in red blood cells, the body counteracts this and swaps it for carbon dioxide

Erythrocytes – carry the oxygen to other parts of the body and then exchange this for carbon dioxide to bring back to the heart to exchange for oxygen.

Plasma – The carbon dioxide which is produced by respiration in the cells diffuses into the blood plasma

Cellular respiration

Role of glucose – glucose is a type of sugar we get from the food we eat. It is glucose that produces the energy required in our body. Every cell in our bodies requires energy to work

Oxygen – oxygen is needed to mix with the glucose to create energy

Function of ATP – stores energy in a simple chemical form to be released to cells

Aerobic/anaerobic respiration – aerobic is using oxygen to produce energy which takes place in the mitochondria.

Anaerobic is when there is not enough oxygen available and energy is produced without oxygen as it is not needed

Production of carbon dioxide – this is produced when the glucose and oxygen mix to create energy

Production of lactic acid – this is produced during intense exercise as we are using more energy and creating more waste products

Production of ATP – when the glucose is broken down with the oxygen it creates ATP which contains the energy needed by the body

Respiratory malfunctions – possible causes and effects

Asthma – the bronchi become inflamed and narrow causing the sufferer to have difficulty breathing or become short of breath. This can be triggered by pollution, dust or animal fur

Emphysema – caused by long term smoking. Cilia are paralysed then killed by the smoke leading to a build-up mucus. This makes it difficult for the sufferer to breath

Cystic fibrosis – caused by a defective gene and causes a thick layer of mucus to build up and block the bronchioles

Monitoring, treatment and care needs for respiratory malfunctions (e.g. impact on lifestyle, inhalers, medication, peak flow, physiotherapy, spirometry, oxygen)

Learning outcome 3: Understand the digestive system, malfunctions and their impact on individuals

Gross structure of digestive system and functions of component parts

Buccal cavity – also known as the oral cavity, found within the mouth

Salivary glands – produce saliva which helps to moisten food and make it easier to swallow

Epiglottis – a muscular flap that prevents food from going down the airway (trachea)

Oesophagus – the tube that leads to the stomach

Stomach – where food is mixed with chemicals to digest nutrients and produce protein for the blood to pick up.

Small intestine – formally known as the duodenum, a long tube where further digestion takes place, helped by fluids from the liver and pancreas

Large intestine – also known as the colon, this is where the remaining food and water is taken. Most of the water is removed and taken by the blood

Rectum – faeces is stored here

Anus – waste is expelled from here

Liver – produces bile to help with the breakdown of food

Gallbladder – stores bile made by the liver until it is needed for digestion

Bile duct – where the bile enters the gut

Pancreas – produces other digestive enzymes to help with the breakdown of food

Pancreatic duct – where these enzymes enter the gut

Mechanical and chemical digestion

Action of chewing – this is part of the mechanical digestion where we break the food down so that it is small enough to swallow

Action of stomach – the stomach churns the food breaking it up into smaller pieces to make it easier to digest nutrients

Action of digestive enzymes in stomach and small intestine – this is the chemical digestion element where proteins, carbohydrates and fats are broken down into

smaller molecules in order for them to pass through the gut wall

Digestive roles of liver and pancreas

Digestive role of pancreatic juice – supplies salts to help with the further chemical digestion and to help break down fats

Digestive role of bile – supplies salts to help with the further chemical digestion and to help break down fats

Absorption and assimilation

Adaptations of intestine wall for absorption (e.g. nutrients) – villi line the wall of the intestine creating a wider surface area to ensure as many nutrients as possible pass through to the blood stream

Liver's role in assimilation – its job is to sort, utilise and distribute the necessary metabolic chemicals

Digestive malfunctions – possible causes and effects

Irritable Bowel Syndrome (IBS) – some of the causes of IBS could be stress, alcohol, caffeine, chocolate and fried food. The muscles of the gut alter their normal rhythms. Alternating bouts of constipation and diarrhoea.

Gallstones – crystals that form in the gall bladder causing pain when they stick in the bile duct

Coeliac disease – reduced absorption of nutrients caused by an immune response to gluten. A high fat diet could be one of the main causes due to the creation of more bile.

Monitoring, treatment and care needs for digestive malfunctions (e.g. impact on diet/lifestyle, endoscopy, ultrasound, lithotripsy and monitoring, medication)

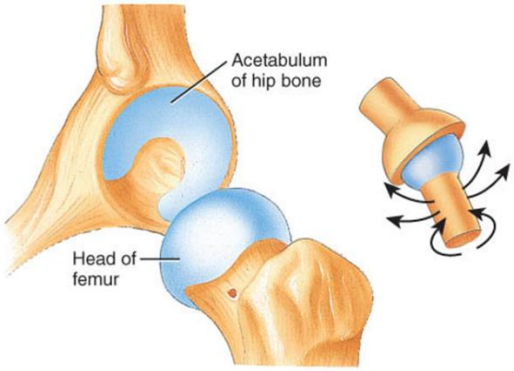
Learning outcome 4: Understand the musculoskeletal system, malfunctions and their impact on individuals

Structure of bone

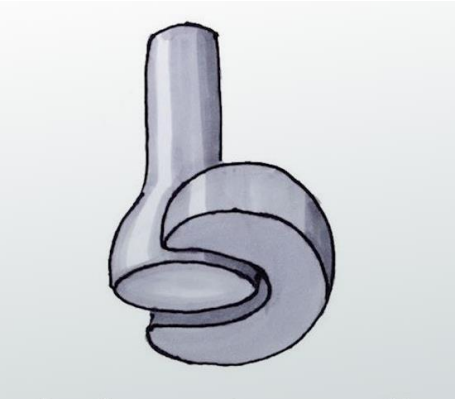
Vertical section of bone – this is where the bone has been split lengthways to show the inside of the bone
Transverse section of bone – this is where the bone has been cut through the middle to show the 'tree like' centre.

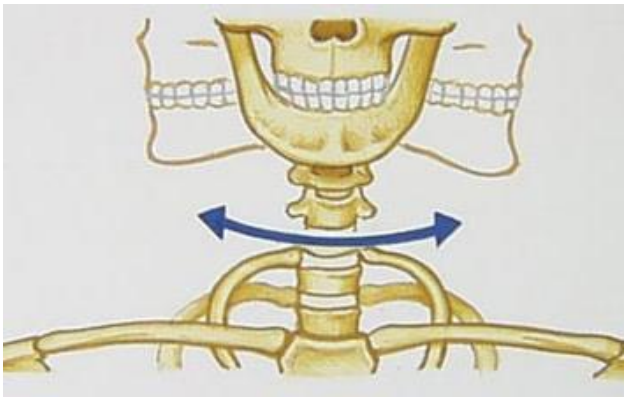
Types of joint

Ball and socket (e.g. hip, shoulder)

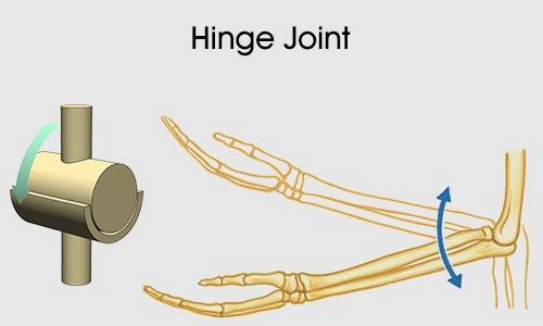


Pivot (e.g. neck)

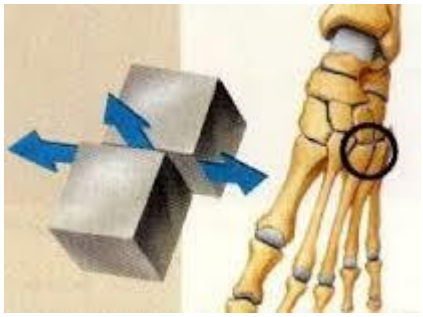




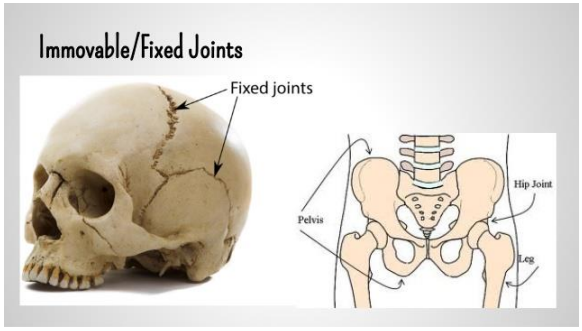
Hinge (e.g. elbow, knee)



Sliding (e.g. wrist, ankle)



Fixed (e.g. cranium, pelvis)



Components of a synovial joint

Muscle – allow the arm to move by contracting and relaxing
Bone – the two bones of the lower arm work with the humerus bone of the upper arm
Ligament – hold bones together and in position
Tendon – attach muscle to bone
Cartilage – tough smooth substance at each end of bones to protect the ends of the bones
Synovial capsule – tough membrane enclosing the joint
Synovial fluid – lubricating fluid within the synovial capsule, also acts as a shock absorber

Muscle action around a joint

Antagonistic action of skeletal muscle – this is where bones have to work in pairs that bring about opposite actions
Contraction – this is where a bone is being pulled into position by the muscle
Relaxation – when the muscle relaxes and the bone goes back to where it was
Role of tendons – these allow the muscles to operate at a distance from the bone

Musculoskeletal malfunctions – possible causes and effects

Arthritis – there are two types of arthritis; osteoarthritis and rheumatoid arthritis. Osteoarthritis is where the cartilage erodes so that the bones rub together. Rheumatoid arthritis is an autoimmune disease where antibodies attack the linings of joints
Osteoporosis – thinning of the bones usually due to ageing. Common in post-menopausal women

Monitoring, treatment and care needs for musculoskeletal malfunctions (e.g. impact on lifestyle, clinical observation, blood tests, bone density scans, physiotherapy, exercise, dietary changes, and assistive technology

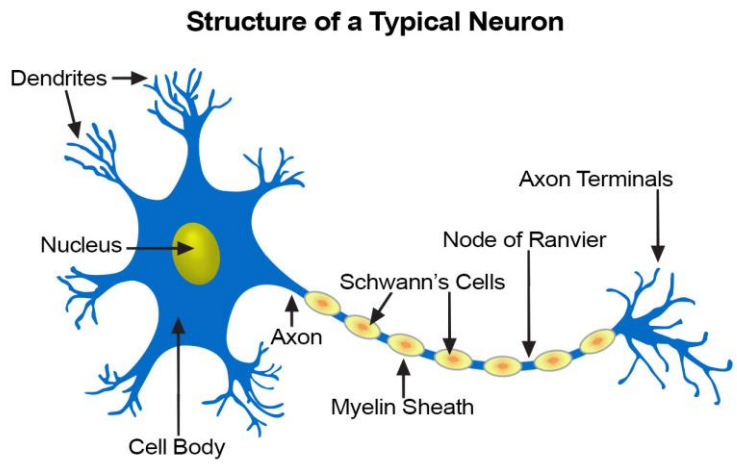
Learning outcome 5: Understand the control and regulatory systems, malfunctions and their impact on individuals

Components of nerve systems

Central Nervous System – includes the brain, spinal cord and peripheral nerves that spread out around the body. This system is voluntary
Autonomic system – involuntary – runs the digestive system etc.
Spinal cord – Leads from the brain to the base of the spine
Sensory neurons – carry messages like pain from the tissues
Motor neurons – carry messages to the muscles

Structure and function of brain
Cerebral cortex – precise functions are linked to certain areas. This is where sensory information is received from various areas of the body and messages sent to the correct muscles
Cerebellum – sends movement messages to the muscles to allow them to move accurately and with skill
Frontal lobes– emotions, language, memory and conscience. It has the ability to change someone's personality if damaged
Corpus callosum – a bridge of nerve tissue connecting the cerebral hemispheres
Hypothalamus – detects changes in blood chemistry and temperature and regulates our appetite and controls a number of hormones including those that prompt our sexual development and reproduction
Medulla –where the brain meets the spinal cord – most basic part of the brain controlling vital processes such as swallowing, heart rhythm and breathing
Meninges – the outer layer of strong membrane made up of three layers

Nerve action
Structure of neuron



Role of axon/Dendron – to transmit information to different neurons, muscles and glands
Myelin sheath – wrapped around neurons like the plastic cover of an electrical cable. Speeds up nerve transmission
Synapse – the microscopic gap between neurons and muscle cells

Organisation and function of endocrine system – glands that produce hormones
Pancreas – produces insulin and glucagon which lower and raise sugar levels in the blood
Pituitary gland – growth hormone, starts puberty
Adrenal glands – produce adrenalin to prepare the body for action by increasing the heartbeat and breathing
Thyroid – regulates cell metabolism, regulates absorption of calcium
Hormones – chemical messengers, carried by to blood to organs where they carry out a specific action

Structure of kidney – learn diagram
Cortex – outer layer of kidney
Medulla – area inside the kidney
Calyx – fibrous white region which collects urine
Ureters – tube from kidney to bladder
Renal artery – connected to the aorta and supplies the kidneys with oxygenated blood
Renal vein – drains returned blood into the inferior vena cava

Urethra – tube from the bladder to the outside for excretion
Bladder – stores urine
Kidney nephron – working part of the kidney

Functions of kidney
Removal of urea – the kidneys filter the blood to collect urea to pass onto the bladder for storing
Ultrafiltration – removes waste, nutrients and water from blood plasma
Reabsorption – useful substances for the body are reabsorbed
Osmoregulation – water regulation

Breakdown functions of liver
Deamination – liver cells break down amino acids to form urea
Detoxification – liver cells remove toxins like alcohol by breaking them down into harmless components
Production of bile –supplies salts to help with the further chemical digestion and to help break down fats

The concept of homeostasis
Principles of homeostasis (monitoring, feedback mechanisms, effectors) and its importance – the role is to monitor and detect any deviation from the optimum and allow these to be corrected, ensuring that the body is at its ideal at all times

Malfunctions of control and regulatory systems – possible causes and effects
Brain – Stroke – caused by a blood clot in the arteries in the brain or a rupture of a blood vessel, depriving the brain of oxygen and nutrients causing cells to die
CNS, i.e. – Multiple Sclerosis (MS) – immune system attacks the central nervous system. Viral, genetic and environmental factors can play a part in causing MS

Endocrine – Diabetes – Type 1 and Type 2. Type 1 is thought to be an autoimmune disease. Type 2 is linked to our intake of carbohydrates and fats resulting in weight gain
Kidney – Nephrotic Syndrome – the immune system overreacts to an infection and start to attack parts of the kidney. Usually responds to treatment, but may result in a kidney transplant
Liver – Cirrhosis – caused by long term abuse of alcohol. The liver cells that are damaged do not get replaced so the liver stops working

Monitoring, treatment and care needs for malfunctions of control and regulatory systems (e.g. impacts on lifestyle, physiotherapy, speech therapy, assistive technology, blood tests, urine tests, eye tests, biopsies, scans, medication, dialysis)

Learning outcome 6: Understand the sensory systems, malfunctions and their impact on individuals

Structure of the eye

Pupil – the opening in the middle of the iris which light passes through

Iris – controls the amount of light passed through into the eye

Tear glands – keeps the eye moist in particular the conjunctiva

Humours or fluids – keep the eye in shape and help nourish it

Conjunctiva – layer which protects the cornea

Cornea – the outer layer which is transparent to allow the light to enter

Retina – light sensitive surface at the back of the eye

Macula – concentrated at the back of the eye in one small region in the centre of the retina. Allows you to see colours

Optic nerve – messages are received and then sent to the brain

Ciliary muscle/suspensory ligaments – the suspensory ligaments attach the lens to the ciliary muscle which contract to stretch the lens to make it flatter and thinner

Lens – changes shape to change the focal distance of the eye so that it can focus on objects at various distances, allowing a sharp image to be created and formed on the retina

Structure of the ear

External – sound waves pass down here to the middle ear

Middle – the air-filled chamber which separates the middle ear from the ear drum

Inner ear – located the other side of the oval window

Eardrum – sound waves cause the ear drum to vibrate

Stapes/incus/malleus ear bones – transmit the vibrations of the eardrum across the middle ear before striking a further membrane

Cochlea – contains a jelly-like fluid

Organ of Corti – membranes lined with sensitive hair-like structures

Eustachian tube – a small passageway which connects the middle ear to the throat and allows the middle ear to be at the same pressure as the atmospheric air

Round window – this is a drum-like membrane which allows vibrations from the oval window to pass through the liquid, rippling the membranes and stimulating the sensitive hairs

Auditory nerve – fire impulses to the brain

Semi-circular canals – further fluid like tubes which are connected to the cochlea but are not involved in hearing

Ampullae – further swellings which are connected to the cochlea but are not involved in hearing

Malfunctions of the eye and ear – possible causes and effects

Eye

Glaucoma – usually due to a build-up of pressure within both eyes. Develops when the aqueous humour fluid cannot drain properly and so the pressure inside the eyeball increases

AMD (age-related macular degeneration) – a painless eye condition that results in the loss of central vision, usually in both eyes. Vision becomes blurred so reading

becomes difficult, colours appear dull and faces are difficult to recognise.

Cataracts – cloudy patches that form in the lens of the eye and cause blurred or misty vision as they stop light from reaching the retina

Retinopathy – is a common complication of diabetes. It occurs when high sugar levels damage the cells of the retina

Ear

Deafness – some people are born deaf, but most cases are due to an illness, for example meningitis or an injury to the head, repeated exposure to loud noises or simply growing older.

Monitoring, treatment and care needs for malfunctions of the eye and the ear (e.g. impacts on lifestyle, visual aids, auditory aids, medication)