Critical Question 1: How is an organism's internal environment maintained in response to a changing external environment?

Construct and interpret negative feedback loops that show homeostasis by using a range of sources, including but not limited to:

Homeostasis

Homeostasis is defined as the maintenance of a stable, relatively constant, internal state within an organism, despite environmental changes. The nervous and endocrine systems work together to ensure many aspects of your internal environment remain within the narrow range required to maintain your health.

One example is how your body keeps your internal temperature close to 37°C.Your body also tries to maintain a consistent blood volume, blood pressure and blood solute concentration by balancing fluid and ion levels.

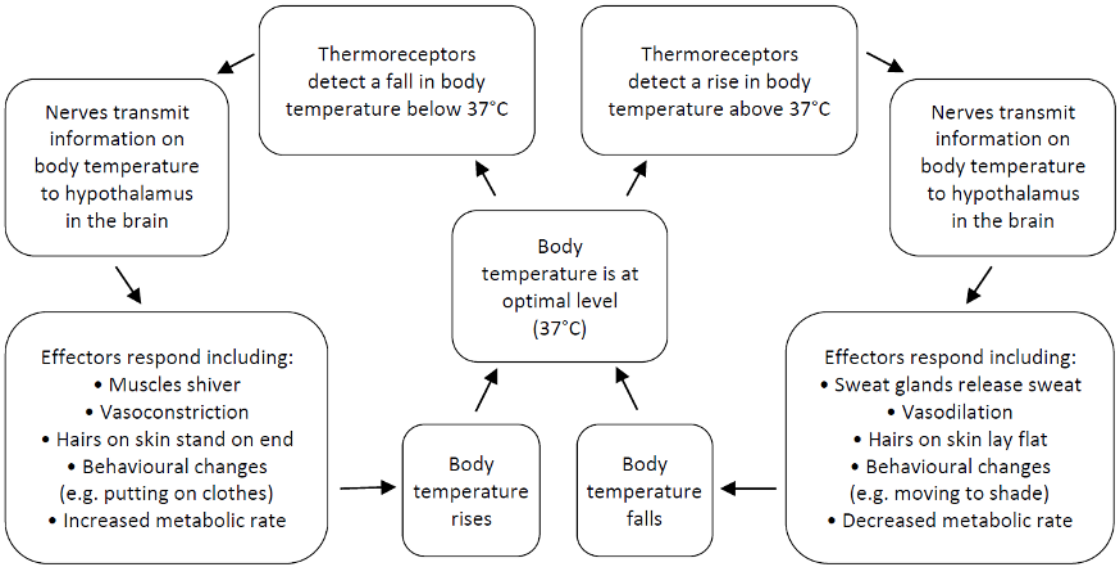
Another example of homeostasis is how your body excretes (removes) carbon dioxide and nitrogenous wastes to help ensure that the blood pH stays close to 7.4. Similarly, your body uses hormones to help regulate blood sugar levels. Maintaining a constant internal environment through homeostasis ensures the efficient transport of substances around the body and in and out of cells. It also ensures that enzymes can function correctly, which in turn ensures that biological reactions can occur quickly enough to sustain life.

Negative feedback loops

Negative feedback loops are diagrams that show how the body detects and counteracts changes in order to maintain homeostasis. One suitable way to draw a negative feedback loop is in a 'figure of 8' shape. This shows the optimal condition in the centre, with one loop depicting detection and response to a change above the optimal, and the other loop depicting detection and response to a change below the optimal.

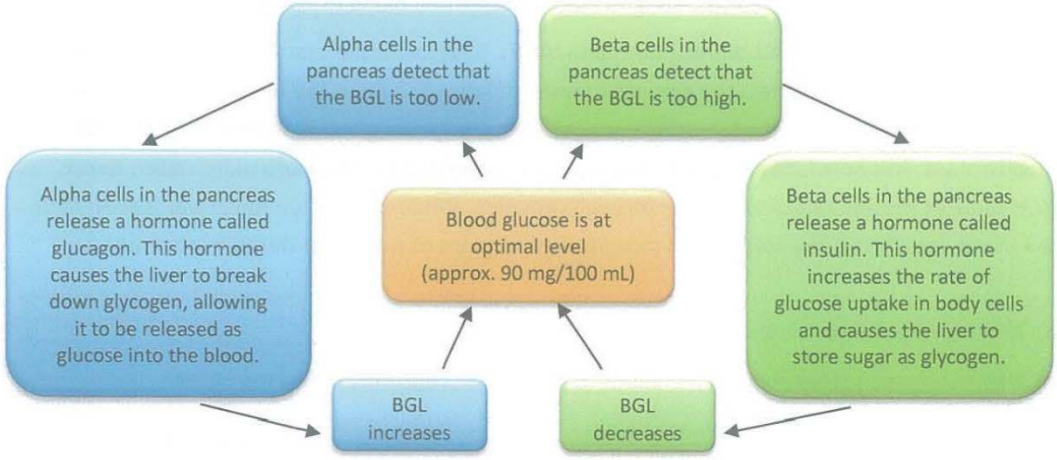
Temperature
Our body attempts to maintain its internal temperature by responding to external temperature changes.

When temperature increases	When temperature decreases
• Sweat glands release sweat onto the skin, which uses heat to evaporate. • Blood vessels near the skin dilate (vasodilation), which increases blood flow to exterior surfaces to radiate heat. • Behavioural changes, e.g., moving to the shade or drinking cool water. • Hairs on the skin lie flat to let air currents get near the skin. • Thyroid hormones cause a decrease in the rate of reactions (metabolic rate) in the body, as these generate heat.	• Hairs on the skin stand on end to reduce air currents on the skin. • Thyroid hormones cause an increase in the rate of reactions (metabolic rate) in the body, as these generate heat. • Skeletal muscles contract involuntarily, causing shivering. • Blood vessels near the skin constrict (vasoconstriction), which reduces blood flow to exterior surfaces to contain heat. • Behavioural changes, e.g. putting on more clothes or crossing your arms.



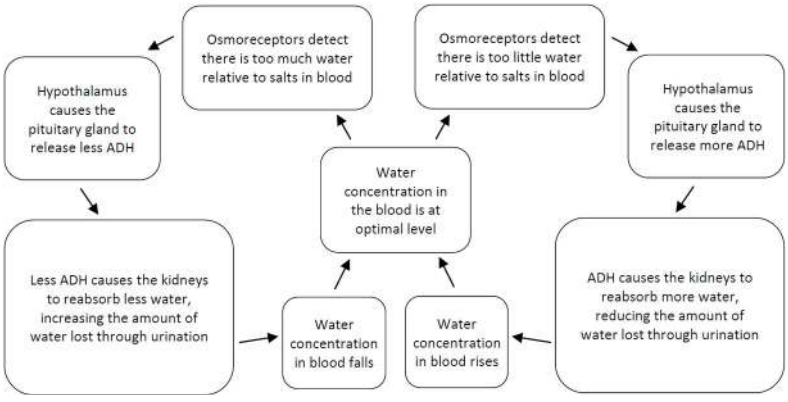
Glucose

Blood glucose levels (BGL) must be kept at a relatively constant level to ensure that cells can maintain an appropriate rate of cellular respiration to provide energy to keep you alive. A low blood glucose level can cause varied symptoms, including lethargy and loss of consciousness. A high blood glucose level can lead to various health conditions, such as heart disease and nerve damage.



Water concentration

Several mechanisms help to maintain homeostasis for water and solute concentration in the blood, tissues and cells. This is an important part of staying healthy, as it allows diffusion in and out of cells to occur correctly, as well as contributing to blood volume and blood pressure.



One mechanism involves anti-diuretic hormone (ADH). A region of the brain called the hypothalamus has osmoreceptors that detect the amount of water relative to salts in the blood. When there is insufficient water content, the hypothalamus causes the pituitary gland to release ADH into the bloodstream. This hormone acts on the kidneys and causes them to reabsorb more water. Hence ADH reduces the amount of water lost through urination. When there is

too much water content in the blood, less ADH is released, which increases the amount of water lost through urination.

investigate the various mechanisms used by organisms to maintain their internal environment within tolerance limits, including:

trends and patterns in behavioural, structural, and physiological adaptations in endotherms that assist in maintaining homeostasis

Endotherms are organisms that are able to internally regulate their body temperature (often called "warm-blooded" – e.g. mammals and birds)

Ectotherms are unable to do this and must change their behaviour based on the external environment to maintain a stable body temperature (often called "cold-blooded" – e.g. reptiles, fish, invertebrates)

Adaptations

Adaptations are features which increases an organisms chance of survival in its environment. They come in 3 types

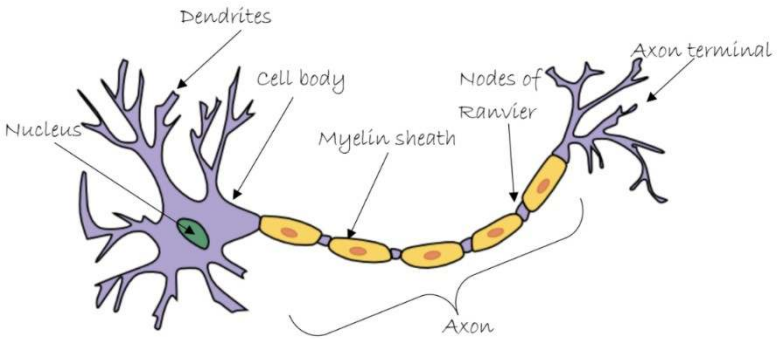
- Structural – physical features
- Behavioural – actions
- Physiological – internal or cellular processes

Endotherms are species which internally regulate their body temperature. These organisms are often referred to as "warm-blooded" and include mammals and birds. Ectotherms, on the other hand, do not have internal regulation of their body temperature, and include "cold-blooded" species such as reptiles, amphibians, and fish.

	Common Wombat	**Australian Fur Seal**
Structural Adaptations	strong claws to dig burrows, therefore obtaining shelter from the sun	dense coat has two layers (woolly underlayer and coarse, long outer layer) to keep the seal dry and warm when in water
Behavioural Adaptations	nocturnal (active during night and sleep during day) to avoid the heat of the sun	basking in sun to raise body temperature after swimming
Physiological Adaptations	slows metabolism to a third of its normal rate on hot days (esp. when resting in burrow) to keep body temperature low	Counter current exchange: warm blood in the arteries (coming from the heart) flows closely past the cold blood in the veins (coming from the fins and extremities) to maintain the core temperature

internal coordination systems that allow homeostasis to be maintained, including hormones and neural pathways

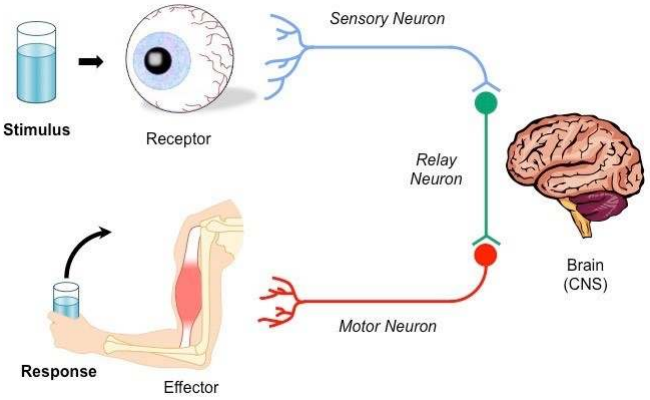
Neural Pathways – The Nervous System



The nervous system consists of nerves that extend all over the body and connect back to the spinal cord and brain. These nerves allow the brain to receive and respond to

information (stimuli) from the internal and external environments. Examples of stimuli include light, sound, touch, pressure, heat and chemical concentrations.

Most conscious and subconscious responses in our bodies begin with sensory receptors detecting a stimulus. Organisms have a number of sensory receptors that allow them to detect stimuli. In humans, the sensory organs (ears, eyes, nose, skin and tongue) have sensory receptors that detect various stimuli, e.g. photoreceptors in the eye can detect light.



Sensory neurons (nerve cells) in the nerves transmit the information as electrochemical signals. These signals travel from the sensory receptors to a control centre (usually the brain), where the information is processed.

The control centre then typically responds to the stimulus by activating motor neurons in the nerves to transmit the information to an effector organ. Effectors produce a response to the stimulus, e.g. muscles cause movement or endocrine glands release hormones.

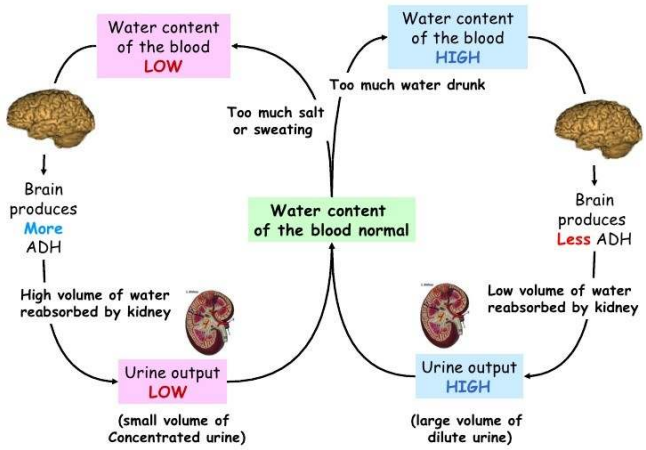
Hormones – Endocrine System

Hormones are chemicals responsible for carrying messages between cells. They are produced by the endocrine system - the set of glands throughout the body that secrete specific hormones.

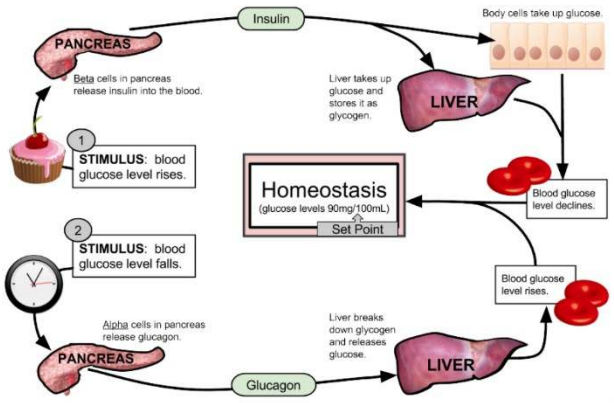
Osmoregulation

Osmoregulation: the maintenance of an internal balance between water and dissolved materials in an organism's body, regardless of environmental conditions.
Regulating hormone: Anti-diuretic hormone (ADH)

Gland producing hormone: Made by the hypothalamus in the brain, stored and secreted by the pituitary gland



When water levels are low: ADH production increases; causes urine concentration to increase, reabsorption of water to increase.
When water levels are high: ADH production decreases; causes urine concentration to decrease, reabsorption of water to decrease.



Glucoregulation

Glucoregulation: the maintenance of an internal balance between the glucose locked away as glycogen and the glucose free in the blood.
Regulating hormone: Glucagon and Insulin
Gland producing hormone: Pancreas

When sugar levels are low: Glucagon production increases; signals to liver to convert glycogen into glucose

and release into the bloodstream.
When sugar levels are high: Insulin production increases; signals to liver to store glucose as glycogen.

mechanisms in plants that allow water balance to be maintained
Maintaining water balance is crucial as plants cannot move to find water. Much of Australia is arid (dry) with very little rainfall, and so plants must minimise water loss to store as much as possible

Adaptations

Adaptations are traits of a species that help if survive in its environment.

Adaptation	How it reduces water loss
Leaf Size	Reducing the size of leaves also reduces the number of stomata which allow water loss. Also reduces surface area exposed to sun. Leaves may resemble needles (e.g. casuarina tree)
Leaf Arrangement	Leaves often hang vertically to reduce exposure to sunlight, such as eucalypts. Some leaves will curl to reduce surface exposure to moving air, which reduces transpiration.
Leaf Surface	Stomata may be sunken into the surface to reduce water loss by minimising air movement. Cuticle may be waxy or leathery, which ensures that all epidermal cells are waterproof. May have white hairs to reflect sunlight, which will reduce the temperature on the surface of the leaf (e.g. Lupinus kingii). Hairs will also reduce air movement across the leaf, which minimise transpiration.
Flower size and shape	Reduced size of flowers or no petals reduces the amount of water needed as well as the evaporation of water from flower surfaces Eucalypt blossoms have no petals, and use brightly coloured stamens to attract pollinators such as birds and possums
Shedding Leaves	Some species (such as eucalypts) will shed leaves or even whole branches in hot weather to reduce the amount of water needed to sustain the plant Gum trees are colloquially known as “widow makers” because of their tendency to drop large branches
Water storage	Succulents (such as pigfaces) store large amounts of water in fleshy stem or leaf structures.

Critical Question 2: Do non-infectious diseases cause more deaths than infectious diseases?

investigate the causes and effects of non-infectious diseases in humans, including but not limited to:
Non-Infectious Diseases are those which are not caused by pathogens, and therefore not transmitted between hosts

Genetic diseases

Genetic diseases occur when a mutation affects your genes or when you have the wrong amount of genetic material. One example is down syndrome which is caused by inheriting 3 chromosome-21.

Example – Down syndrome

Cause: Additional chromosome-21
Effect: Mild to moderate mental retardation and poor muscle tone.

Diseases caused by environmental exposure

Can be triggered by exposure to substances in environment (e.g. mesothelioma from asbestos, lead poisoning). Can also be caused by lifestyle factors (e.g. stress, exercise habits, occupation or recreational activities, sleep). May also have a genetic component

Example – Skin Cancer

Cause: Excessive exposure to UV radiation, Causes melanoma that develops when a mole becomes cancerous
Effect: Most lethal form of skin cancer and tumours start in the pigment-producing melanocytes in the skin

nutritional diseases

Can include undernutrition (not enough of one or more nutrients) or overnutrition (too much of one or more nutrients). Examples include anaemia (iron deficiency), scurvy (vitamin C deficiency), rickets (vitamin D deficiency) and high cholesterol. Often straightforward to treat - however can also be linked to genetic or lifestyle factors

Example – Anaemia

Cause: Iron deficiency
Effect: Reduces the production of healthy blood cells so the blood is unable to carry enough oxygen to the tissues

Cancer

Occurs when cell replication is not regulated correctly, and cells replicate rapidly and uncontrollably. Many possible risk factors - can be linked to environmental factors (e.g. skin cancer), genetics (e.g. breast cancer), foods. Can also be entirely random and unavoidable (mutations)

Example – Lung Cancer

Cause: Tobacco smoking; Carcinogens damage the cells that line the lungs
Effect: Can't breathe, lungs unable to function

Tumour Suppressor Genes

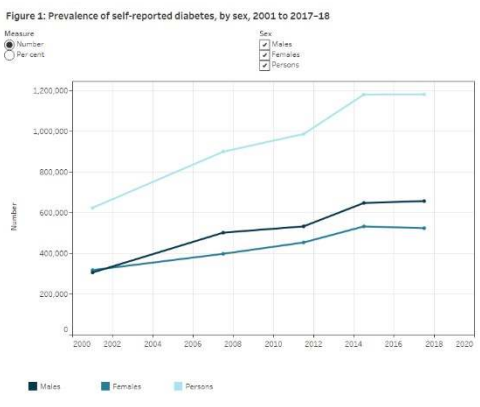
We have genes responsible for repairing damaged DNA and preventing tumours (groups of cancer cells) from developing

Mutations in certain tumour suppressor genes are linked to certain types of cancer - e.g. BRCA1 is a gene that, if mutated, can cause a predisposition to breast and ovarian cancers. These mutations can be screened for, which can enable patients to help reduce their risk of these cancers (e.g. by minimising other risk factors, preventative surgery, etc.)

collect and represent data to show the incidence, prevalence and mortality rates of non-infectious diseases, for example:

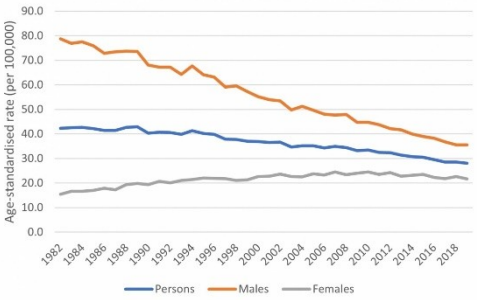
Nutritional diseases

Diabetes



- 2015 there were 16400 deaths due to diabetes with 55% being type 2
- In 2016 diabetes was Australia's 7th leading cause of death
- ABS 1.2 million people had diabetes and 85% had type 2

Diseases caused by environmental exposure



Lung cancer

- Is the leading cause of death and was the fifth most common cancer in Australia 2015
- 2014, 8251 people died from it and in 2017 it increased to 9021

Critical Question 3: Why are epidemiological studies used?

analyse patterns of non-infectious diseases in populations, including their incidence and prevalence, including but not limited to:

nutritional diseases

Done above

diseases caused by environmental exposure

Done above

investigate the treatment/management, and possible future directions for further research, of a non-infectious disease using an example from one of the non-infectious diseases categories listed above

Diabetes

Diabetes is a serious complex condition which can affect the entire body. Diabetes requires daily self care and if complications develop, diabetes can have a significant impact on quality of life and can reduce life expectancy. While there is currently no cure for diabetes, you can live an enjoyable life by learning about the condition and effectively managing it.

Treatment/Management

Evidence, including large-scale randomised control trials, shows type 2 diabetes can be prevented or delayed in up to 58 per cent of cases by maintaining a healthy weight, being physically active and following a healthy eating plan.

People at risk of type 2 diabetes can delay and even prevent the condition by:

- Maintaining a healthy weight
- Regular physical activity
- Making healthy food choices
- Managing blood pressure
- Managing cholesterol levels
- Not smoking.

One example of NSW attempting to manage diabetes is Beat It. Beat It Gym is a program that runs over 8 weeks and involves moderate intensity aerobic, strength and balance-based exercises as well as education sessions on healthy living topics.

Future directions for research

Researchers are looking into the autoimmune process and environmental factors that lead people to developing type 1 diabetes to help prevent type 1 diabetes in the future.

Lung Cancer

Lung cancer starts when abnormal cells grow and multiply in an uncontrolled way. Cancer that begins in the lungs is called primary lung cancer.

Treatment/Management

People with non-small cell lung cancer can be treated with surgery, chemotherapy, radiation therapy, targeted therapy, or a combination of these treatments. People with small cell lung cancer are usually treated with radiation therapy and chemotherapy. Surgery can be used to remove cancerous cells. Not smoking is the biggest prevention to lung cancer

Future directions for research

NCI-funded researchers are working to advance our understanding of how to prevent, detect, and treat lung cancer. There has been a great deal of progress made, for scientists are identifying many different genetic alterations that can drive lung cancer growth.

Below are 2 examples of how progress is being made from research

- Analysing blood samples to learn whether finding tumour cells or molecular markers in the blood will help diagnose lung cancer early.
- Examining sputum samples for the presence of abnormal cells or molecular markers that identify individuals who may need more follow-up.

Evaluate the method used in an example of an epidemiological study

Epidemiology - The study of the distribution & determinants of diseases & health data in specified populations

Epidemiological data can be used to predict patterns of disease and infer the cause or risk factors for various diseases. They can also be used to evaluate treatments or strategies used to address health issues.

Epidemiological Studies

Epidemiological studies collect data on trends in disease in a population over time. It can be used to predict patterns, infer causes or risk factors or evaluate management strategies

Descriptive studies

Provide information about patterns of disease, including:

- Frequency
- Which section of the population is affected
- Geographical location
- Time period

Relevant data are collected about the affected individuals. Hypotheses about cause are proposed

Analytical studies

Conducted after a descriptive study

Data such as morbidity (no. cases of the disease), mortality (death rate), incidence (no. new cases in a period) and prevalence (no. affected at one time)

Can be case-control studies (comparing affected and unaffected) or cohort studies (comparing two unaffected groups, one exposed to a suspected cause and one which is not, over time)

Intervention studies

Used to test the effectiveness of a treatment or public health campaign

This can be experimental (participants randomly divided into 2 groups; one given treatment and one given a placebo). The best studies are blind - i.e. researcher doesn't know which group is which until after results are analysed

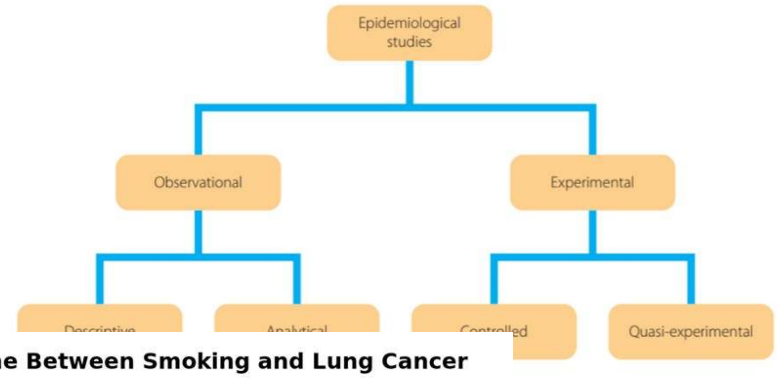
Can also be quasi-experimental (researcher chooses which participants are given treatment)

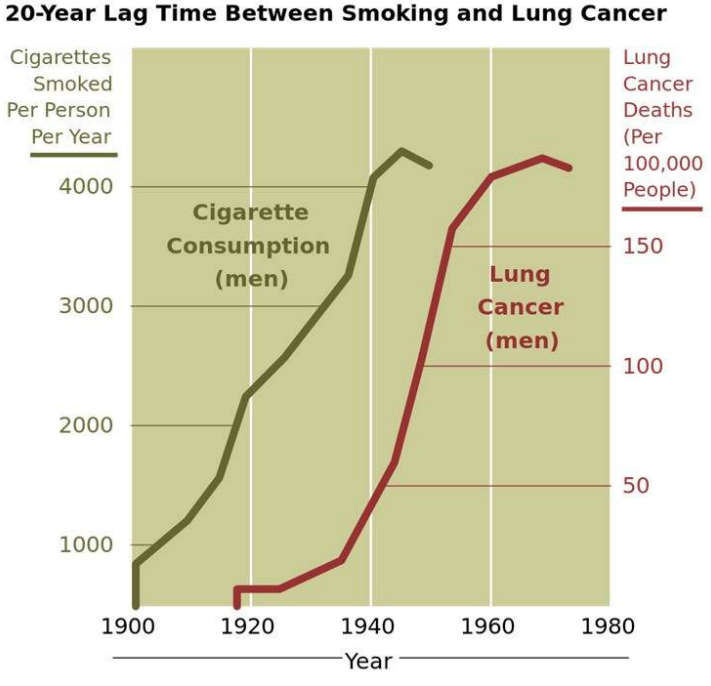
Evaluate, using examples, the benefits of engaging in an epidemiological study

Features of a good epidemiological study

- Conducted over long periods of time
- Very large sample size (1000+)
- Collect range of data (age, sex, diet, occupation) from both affected and unaffected people
- Represent the wider population
- Use control groups (not exposed to potential cause)
- Collect data on incidence, prevalence, mortality and morbidity
- Analyse data to identify patterns and trends
- Identify possible cause of disease and any risk factors
- Develop management plan to control disease
- Evaluate effectiveness of control and treatment programs

Types of epidemiological studies





Sources of errors

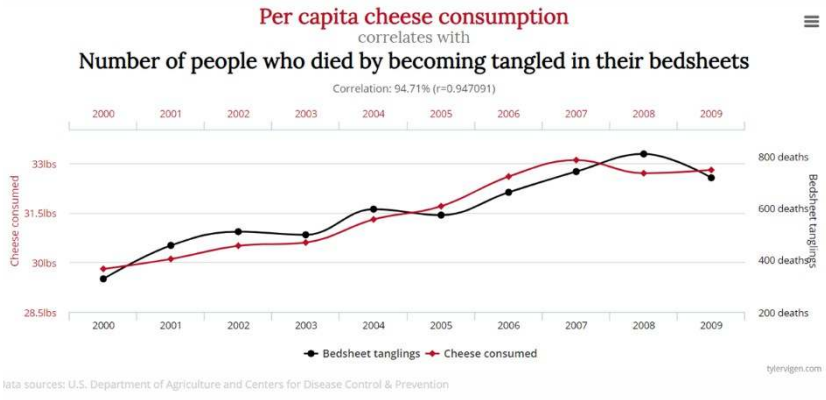
Random error – due to differences in subjects giving variations in results

Systematic error – also called bias; can include:

- Selection bias – in the selection of participants for the study
- Information bias – in the recording or measuring of results

One of the first signs that something is the cause of a disease is a correlation – the trend of disease follows the trend of the suspected cause. This was recognised between smoking and lung cancer

Correlation does not necessarily mean that something is the cause of a disease; it could be the other way around, or totally unrelated (i.e. coincidenta) One example is the cheese consumption and tangled bed sheets graph.



Critical Question 4: How can non-infectious diseases be prevented?

use secondary sources to evaluate the effectiveness of current disease-prevention methods and develop strategies for the prevention of a non-infectious disease, including but not limited to:

Educational programs and campaigns

In order to prevent non-infectious disease, governments and health agencies use a range of strategies to educate the public, actively prevent diseases and minimise the factors that cause these diseases. These can include public health campaigns (such as advertising, vaccination programs and education initiatives) or utilising biotechnology such as genetic engineering. An example of a non-infectious disease that has been addressed using these approaches is cervical cancer.

Cervical Cancer

The human papilloma virus (HPV) is one virus that leads to cancer developing overtime. In 99% cases, it is the cause of Cervical cancer. It also contributed to vaginal, vulva, penile, anal and throat cancers. Early symptoms of cervical cancer include unusual vaginal bleeding and unusual vaginal discharge. Advanced cervical cancer can cause loss of fertility and death. For this reason, since 1991, Australia has had a free national cervical cancer screening program for women, which involves a doctor taking a sample of cells from the cervix for testing. This has allowed pathologists to look for HPV and detect it early before cervical cancer forms. This helps lower prevalence and incidence of cervical cancer, with the help of the national cervical cancer screening program

Genetic engineering

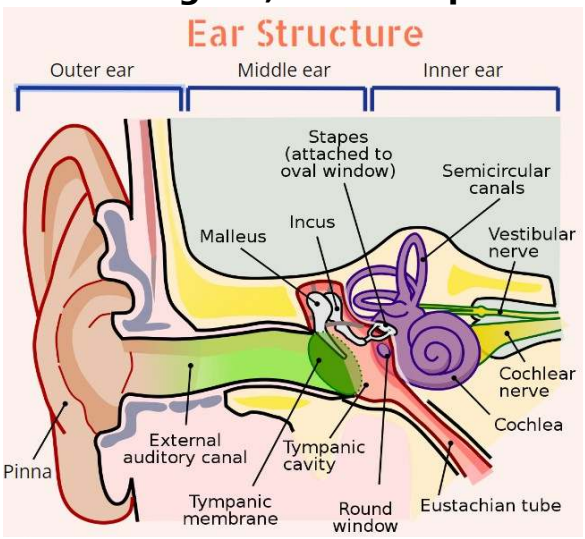
Genetic engineering (also called genetic modification) is a process that uses laboratory-based technologies to alter the DNA makeup of an organism.

Cervical cancer

Research that began at the University of Queensland in 1990 led to the development of Gardasil, a vaccine that protects against four types of HPV (the main cause of cervical cancer). This vaccine is produced through inserting HPV genes into genetically engineering yeast. The HPV genes produce the viral proteins used to make the outer covering of the virus and form virus like particles. These particles are antigenic and produce memory B and T cells providing immunity to the strains of HPV included in the vaccine.

Critical Question 5: How can technologies be used to assist people who experience disorders?

explain a range of causes of disorders by investigating the structures and functions of the relevant organs, for example: Hearing loss



Sound is simply the vibration of particles. Our brain detects the speed and quality of the vibration and converts it into what we perceive as sound

Outer ear - sound waves travel through air

Middle ear - sound waves travel through membrane & bone

Inner ear - sound waves travel through fluid, then are converted to electrical signals by organ of Corti

Auditory nerves - electrical signals carried to brain

Ear structure

Outer ear

Pinna - external dish-shaped skin & cartilage; funnels sound into ear canal

Ear canal - hollow tube leading into the head (also called auditory canal)

Middle ear

Tympanic membrane (ear drum) - thin membrane that vibrates when sound waves hit it

Ossicles - tiny bones - vibrations travel through:

- Malleus (hammer) - connected to ear drum
- Incus (anvil) - in middle
- Stapes (stirrup) - connected to oval window

Inner ear

Round (oval) window - opening covered by thin membrane between tympanic cavity & cochlea

Cochlea - snail-shaped organ filled with fluid

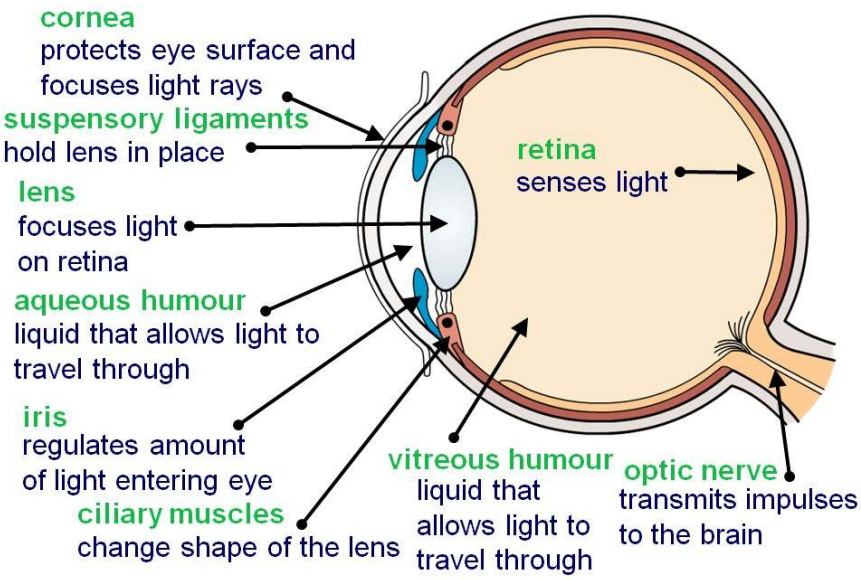
Semicircular canals - contain proprioceptors (receptors for pressure & direction) that help maintain balance

Organ of Corti - inside spiral part of cochlea; membrane covered in rows of hair cells which detect vibrations in fluid. It converts vibrations into electrical signal & sends this through the auditory nerves to the brain

Eustachian tube - connects tympanic cavity (space around ossicles) to back of throat; balances pressure in middle & inner ear

Visual disorders

Structure



Refraction

When light moves from one substance to another, it bends - this is called refraction

As light travels through the eye, it is refracted by the cornea, aqueous humor, lens and vitreous humour - especially the cornea and lens.

This controls the direction of the light rays

Focusing the eye

- The eye collects light & focuses it onto one point on the retina (focal point)
- Cornea & lens refract light rays so that they converge (travel towards one another)
- To see a clear image, the focal point must be exactly on the retina
- Cells at the focal point on the retina detect the amount of light (rod cells) and the colour of light (cone cells)
    - To focus the eye, the ciliary muscles contract or relax to change the shape of the lens
    - To focus on a close object, the muscles tighten → suspensory ligaments relax → lens becomes more curved
    - To focus on a far object, the muscles relax → suspensory ligaments tighten → lens becomes flatter

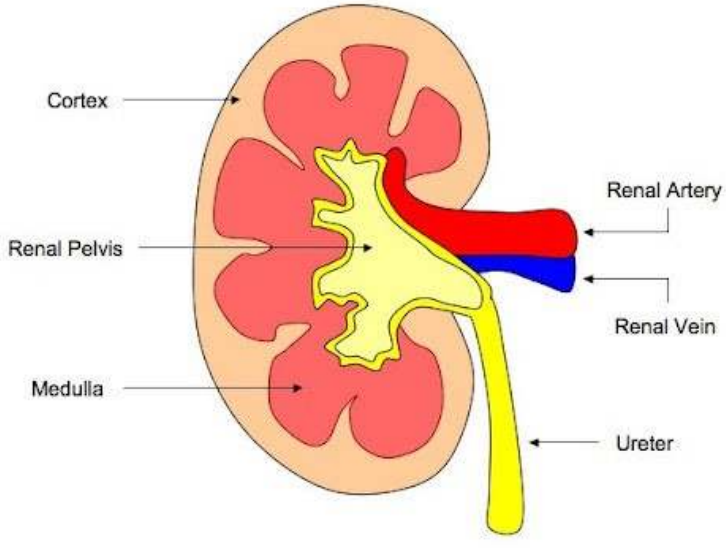
Loss of kidney function

Kidneys

Two bean-shaped organs sitting just under the lungs near the back of the body

Part of the urinary system (with urethra and bladder)

Responsible for filtering waste out of blood and osmoregulation. When excess amino acids (from food or cellular processes) are broken down by the liver, a waste product called urea is produced. This becomes toxic to cells in high amounts and must be removed. Excess water and salt are also removed. Also help maintain homeostasis by regulating pH, blood pressure and levels of other nutrients



Structure

Cortex & medulla - where filtration & reabsorption occur

Renal pelvis - collects waste from cortex & medulla

Ureter - carries waste (urine) to bladder

Renal artery - blood enters kidney before filtration

Renal vein - blood leaves kidney after filtration

Nephrons

Cortex & medulla contain sets of tubules called nephrons. Each kidney contains around one million nephrons

Nephrons are responsible for filtration (removing substances from blood) and reabsorption (adding substances back in)

Structure

Yellow = tubules - carry substances removed from blood

Red & blue = blood vessels - wrapped around tubules so that substances can move in & out

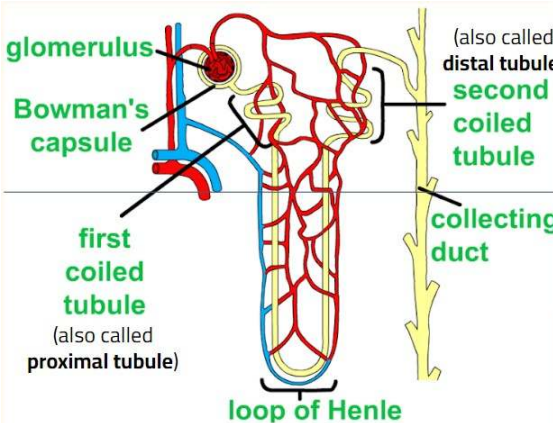
Glomerulus - ball of capillaries with blood under high pressure

Bowman's capsule - tube surrounding glomerulus

Loop of Henle - long section of tubule where reabsorption occurs

Other tubules - connect LoH to other structures

Collecting duct - carries urine to renal pelvis



investigate technologies that are used to assist with the effects of a disorder, including but not limited to:
evaluate the effectiveness of a technology that is used to manage and assist with the effects of a disorder
hearing loss: cochlear implants, bone conduction implants, hearing aids

Types of hearing disorders

Conductive - sound waves not correctly transmitted through outer & middle ear

Sensorineural - sound waves not converted into electrical signals in inner ear

Can be caused by:

- Genetics
- Other medical conditions (e.g. meningitis, syphilis)
- Environment (e.g. exposure to loud sounds)
- Physical damage or injury

Hearing quality

Hearing degenerates over time and with exposure to loud noises

Loud sounds produce strong vibrations - if these are too strong, they break the hair cells in the organ of Corti which cannot grow back

Fewer hair cells mean that fewer signals are produced & sent to the brain

Treatment of hearing disorders

Hearing aids

- Consist of microphone, amplifier & speaker
- Amplify sound to increase vibrations and make it easier for the ear to perceive it
- Can be used for conductive hearing loss when normal levels of sound are not detected by hair cells (sometimes due to deterioration) or if there is some kind of blockage

Bone conduction implants

- Consist of device implanted under skin or through skin connected to processor on outside of head
- Processor picks up sound and sends it as electrical signal to implant, which converts it to vibrations against the skull
- Vibrations can then be transmitted through the rest of the ear
- Often used for conductive hearing loss when there is internal damage to the ear and a hearing aid would not be effective, or if ear infections are common or likely

Cochlear Implants

- Consist of external processor and internal implant
- Rather than producing mechanical vibrations, implant transmits an electrical signal directly to the auditory nerve
- Bypasses any damaged or non-functional parts of the ear, and avoids the need for detecting sound waves altogether
- Used for conductive or sensorineural hearing loss

visual disorders: spectacles, laser surgery

Myopia and hyperopia are focal disorders - light does not correctly focus on the back of the retina

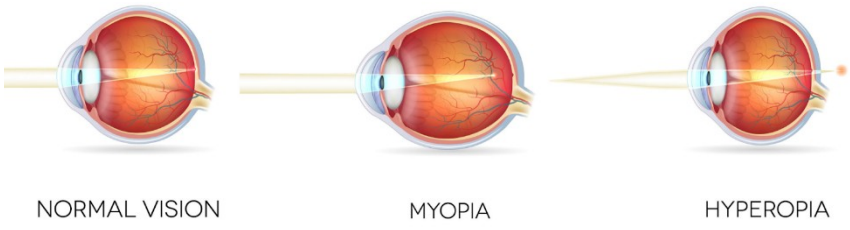
Myopia (short-sightedness) - focal point is in front of retina

Hyperopia (long-sightedness) - focal point is behind retina

Myopia

Close objects will be clear, distant objects will be blurred

Can be caused by elongation of eyeball, cornea refracting too strongly or lens not flattening enough when accommodation occurs



Treatment of Myopia

- Easily treated with glasses or contact lenses
- Adding a concave lens (curved inwards) increases the focal length

Hyperopia

Distant objects will be clear, close objects will be blurred

Can be caused by eyeball being too rounded, cornea not refracting effectively enough or lens being too flat (sometimes due to lack of elasticity in old age)

Treatment of hyperopia

- Easily treated with glasses or contact lenses
- Adding a convex lens (curved outwards) decreases the focal length

Treatment of Visual disorders

Laser eye surgery can be used to correct myopia or hyperopia. A laser beam is used to reshape the cornea (to adjust the curve) so that the eye will focus correctly. Since the shape of the cornea is permanently changed, an individual's sight can be permanently repaired

Cataracts develop when the lens becomes cloudy (often due to aging or injury). Reduces transmission of light through lens - vision becomes blurred and sensitivity to glare can be increased. Treated by replacing the lens with an artificial lens

loss of kidney function: dialysis

Kidney Failure

Occurs when kidneys are no longer able to filter blood effectively

Can be due to:

- Genetic or chronic conditions (e.g. kidney dysplasia - malformed kidneys)
- Other illnesses (e.g. diabetes)
- Injury or damage

Treatment for kidney failure

Kidney Transplant

Kidney transplant - surgically inserting a healthy donated kidney (can be from living donor)

Requires matching cell markers - best chance is from a relative

Wait time up to 10 years

Dialysis

Dialysis - artificial filtration of blood

Two main types:

- Hemodialysis - blood removed from body through intravenous tubes and passed through dialysis machine (dialyser); contains dialysate (fluid that absorbs wastes); blood then returned to body
- Peritoneal dialysis - catheter tube connects body to bag containing dialysate; bag changed regularly to provide fresh dialysate