WJEC England Biology GCSE

4.1 - Nervous coordination and control in humans

Flashcards

What is the nervous system made up of?

What is the nervous system made up of?

CNS and nerves

What is the function of the nervous system?

What is the function of the nervous system?

Allows an organism to rapidly react to environmental and internal changes

What is the central nervous system (CNS)?

What is the central nervous system (CNS)?

Brain and spinal cord

What is the peripheral nervous system?

What is the peripheral nervous system?

Nerves outside of the CNS

What are sense organs?

What are sense organs?

- A group of receptor cells that detect specific stimuli (environmental and internal changes)
- Send information to the CNS along neurones

Give an example of a stimulus

Give an example of a stimulus

Chemicals, temperature, light, sound etc.

What are neurones?

What are neurones?

Nerve cells adapted to quickly transmit nerve impulses. They are the functional units of the nervous system.

What is a nerve?

What is a nerve?

Group of neurones that transfer information as electrical impulses in the nervous system

What is the function of sensory neurones?

What is the function of sensory neurones?

Carry impulses from sense organs (receptors) to the central nervous system

Describe how sensory neurones are adapted to their function

Describe how sensory neurones are adapted to their function

- **Long dendron** carries impulses from receptors to cell body
- Cell body found **part way** along neurone
- **Short axon** carries impulses from cell body to CNS

What is the function of motor neurones?

What is the function of motor neurones?

Carry impulses from the central nervous system to effectors (muscles and glands)

Describe how motor neurones are adapted to their function

Describe how motor neurones are adapted to their function

- **Short dendrites** carry impulses from CNS to cell body
- Cell body found at **one end** of the neurone
- **Long axon** carries impulses from cell body to effectors

What is a reflex?

What is a reflex?

- Automatic response to a stimulus by the body
- Involuntary - does not involve conscious part of the brain
- Protective mechanism

Give some examples of reflexes

Give some examples of reflexes

- **Withdrawal reflex** - pulling away e.g. initiated when a hot object is touched to prevent burns
- **Blink reflex**
- **Pupil reflex** - pupils constrict to prevent damage to the eye by bright light

What does a reflex arc involve?

What does a reflex arc involve?

- Stimulus
- Receptor (sensory organ)
- Coordinator
- Effector
- Response

What is the coordinator in a reflex arc?

What is the coordinator in a reflex arc?

Spinal cord

What is the role of the coordinator?

What is the role of the coordinator?

Coordinates information from the receptors and transmits impulses to the effectors

Describe the reflex arc

Describe the reflex arc

stimulus → receptor → sensory neurone → relay neurone → motor neurone → effector → response

Outline the function of a relay neurone

Outline the function of a relay neurone

Carries impulses from sensory neurones to motor neurones within the central nervous system

What is a synapse?

What is a synapse?

A small gap between neurones across which a nerve impulse is transmitted via neurotransmitters

Why is a reflex automatic?

Why is a reflex automatic?

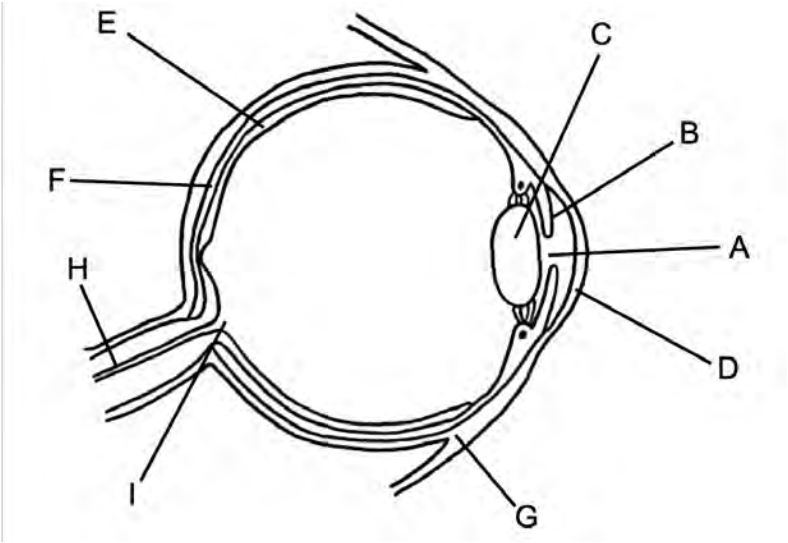
Impulses do not travel through neurones in the brain

Why is a reflex fast?

Why is a reflex fast?

Impulses must only cross through two synapses (which slow them down) in the spinal cord

Identify the structures of the eye labelled in the diagram below



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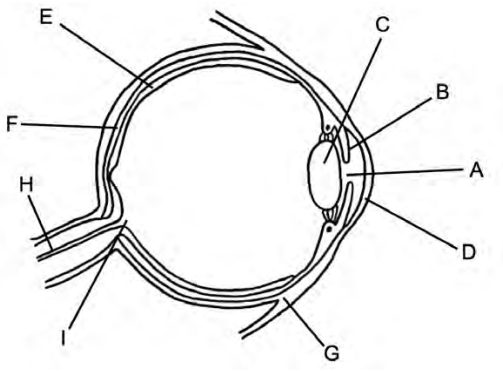


A	pupil	**F**	choroid
B	iris	**G**	sclera
C	lens	**H**	optic nerve
D	cornea	**I**	blind spot
E	retina		

Outline the function of the cornea

Outline the function of the cornea

Refracts light entering the eye

What is the function of the iris?

What is the function of the iris?

Controls the size of the pupil to alter how much light enters the eye

What is the pupil?

What is the pupil?

A hole in the iris centre that allows light rays to enter the eye

What is the function of the lens?

What is the function of the lens?

Refracts light, focusing it onto the retina

What is the function of the choroid?

What is the function of the choroid?

Absorbs light, preventing internal reflection

Outline the function of the sclera

Outline the function of the sclera

Maintains eyeball shape

What is the function of the retina?

What is the function of the retina?

- Contains light receptor cells
- Convert light energy into neural signals which are sent to the brain via the optic nerve

What is the function of the optic nerve?

What is the function of the optic nerve?

It transmits nerve impulses to the brain from the retina

What is the blind spot?

What is the blind spot?

- Where the optic nerve leaves the eye
- Contains no light receptor cells

What is long-sightedness?

What is long-sightedness?

- Can focus on distant objects clearly
- Cannot focus on near objects

What are the causes of long-sightedness?

What are the causes of long-sightedness?

- Eyeball is too short
- Lens is less elastic (usually age-related)
- ∴ light rays are not focussed onto the retina, instead converging behind the retina

How is long-sightedness treated?

How is long-sightedness treated?

- Using a convex lens (causes light rays to converge) in glasses or contact lenses
- Replacement lenses
- Laser eye surgery

What is short-sightedness?

What is short-sightedness?

- Can focus on near objects clearly
- Cannot focus on distant objects

What are the causes of short-sightedness?

What are the causes of short-sightedness?

- Eyeball is too long
- Lens is too thick and too rounded
- ∴ light rays are not focussed onto the retina, instead converging in front of the retina

How is short-sightedness treated?

How is short-sightedness treated?

- Using a concave lens (causes light rays to diverge) in glasses or contact lenses
- Replacement lenses
- Laser eye surgery

What are cataracts?

What are cataracts?

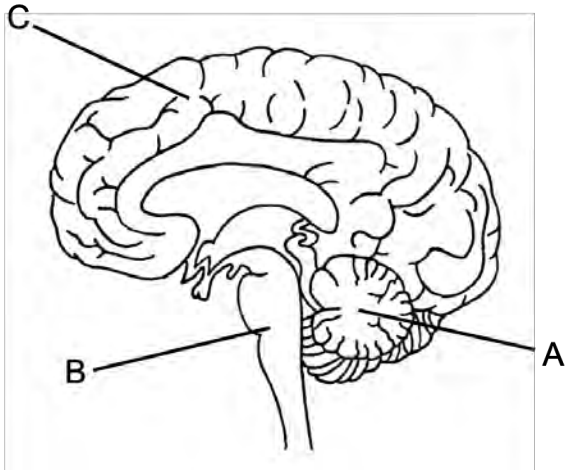
- A cloudy patch forms on the lens of the eye which negatively affects vision
- Vision becomes blurry, difficult to see the intensity of colours, problems with glare etc.

How are cataracts treated?

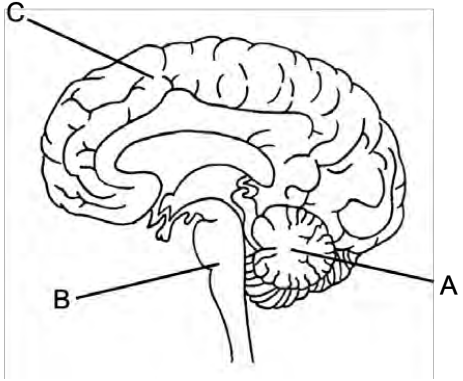
How are cataracts treated?

The clouded lens is exchanged for a synthetic lens during surgery.

Identify the structures of the brain labelled in the diagram



Identify the structures of the brain labelled in the diagram



A = cerebellum

B = medulla

C = cerebral hemispheres

Describe the structure of the cerebral hemispheres

Describe the structure of the cerebral hemispheres

- Two hemispheres
- Largest region of the brain

What is the function of the cerebral hemispheres?

What is the function of the cerebral hemispheres?

Involved in:

- Intelligence
- Language
- Memory
- Emotion
- Visual and sensory processes

What is the function of the left cerebral hemisphere?

What is the function of the left cerebral hemisphere?

Sensory information is received from the right side of the body and controls muscle coordination on the right

What is the function of the right cerebral hemisphere?

What is the function of the right cerebral hemisphere?

Sensory information is received from the left side of the body and controls muscle coordination on the left

Where is the cerebellum located?

Where is the cerebellum located?

Lower region of the brain

What is the function of the cerebellum?

What is the function of the cerebellum?

Involved in:

- Coordination of muscles
- Voluntary movement e.g. walking
- Non-voluntary movement e.g. balance

What is the function of the medulla?

What is the function of the medulla?

Controls automatic processes in the body e.g. breathing rate, heart rate, peristalsis

Why is it difficult to study the brain? (higher)

Why is it difficult to study the brain? (higher)

- It is composed of billions of neurones
- Many areas of the brain have more than one function
- It involves the observation of effects experienced by living patients e.g. the stimulation of one area of the brain may affect vision which can only be identified by the patient themselves
- It can be difficult to interpret test results

What methods, other than surgery, are used by doctors to observe the brain? (higher)

What methods, other than surgery, are used by doctors to observe the brain? (higher)

- MRI scan
- Electrical stimulation

How is electrical stimulation used to study the brain? (higher)

How is electrical stimulation used to study the brain? (higher)

Used to observe how the stimulation of certain areas of the brain affects an individual

How does an MRI scanner work? (higher)

How does an MRI scanner work? (higher)

- Uses a magnetic field and radio waves
- High frequency radio waves absorbed and transmitted through brain tissue
- Computer detects signals to produce a 3D image

How is an MRI scan used to study the brain? (higher)

How is an MRI scan used to study the brain? (higher)

- Can detect different tissue types e.g. tumours
- Enables the identification of greater brain activity when performing specific tasks due to increased blood flow (image brighter)

Describe the ethical issues surrounding the study of brain damaged patients (higher)

Describe the ethical issues surrounding the study of brain damaged patients (higher)

Difficult to get informed consent from severely brain damaged patients

Why is it difficult to treat damage to the CNS? (higher)

Why is it difficult to treat damage to the CNS? (higher)

- Damage to neurones cannot be repaired e.g. deterioration of nervous tissue in Parkinson's disease and multiple sclerosis is permanent
- Hard to reach some areas of the brain
- Risk of further damage to other areas of the CNS during surgery

Why is damage to neurones permanent? (higher)

Why is damage to neurones permanent? (higher)

Nerve cells do not divide by mitosis (so cannot be repaired or replaced)

What is Parkinson's disease? (higher)

What is Parkinson's disease? (higher)

Degenerative disease of the nervous system where brain cells gradually become damaged or die

What is multiple sclerosis? (higher)

What is multiple sclerosis? (higher)

- Degenerative disease of the nervous system where nerve cells gradually become damaged

- It is an autoimmune disease. The immune system attacks the body's own nerve cells.