Edexcel Biology GCSE

Topics 2.10B to 2.14 - The nervous system

Flashcards

What is the central nervous system?

What is the central nervous system?

Brain and spinal cord

What is the spinal cord? (biology only)

What is the spinal cord? (biology only)

A long, thin structure composed of neurones that extends from the medulla oblongata down the spine.

What is the function of the spinal cord? (biology only)

What is the function of the spinal cord? (biology only)

Connects the peripheral nervous system (nerves outside of the CNS) to the brain.

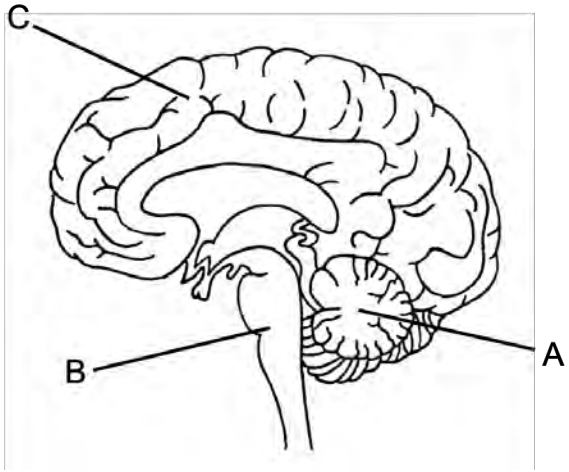
Describe the structure of the brain (biology only)

Describe the structure of the brain (biology only)

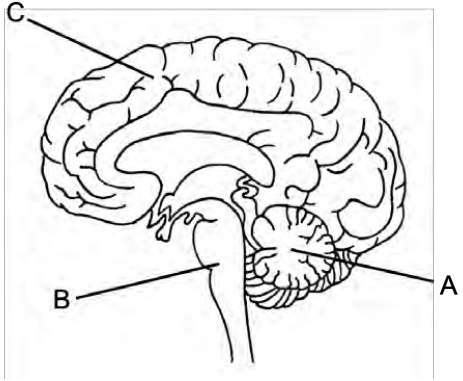
Consists of three main regions:

- Cerebrum
- Cerebellum
- Medulla oblongata

Identify the structures of the brain labelled in the diagram (biology only)



Identify the structures of the brain labelled in the diagram (biology only)



A = cerebellum

B = medulla oblongata

C = cerebrum

Describe the structure of the cerebrum (biology only)

Describe the structure of the cerebrum (biology only)

- Largest region of the brain
- Divided into two hemispheres

What is the function of the cerebrum? (biology only)

What is the function of the cerebrum? (biology only)

Involved in:

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

What is the function of each cerebral hemisphere?(biology only)

What is the function of each cerebral hemisphere? (biology only)

- Left hemisphere receives sensory information from the right side of the body and controls muscle coordination on the right
- Right hemisphere receives sensory information from the left side of the body and controls muscle coordination on the left

Where is the cerebellum located?

(biology only)

Where is the cerebellum located? (biology only)

Lower region of the brain

What is the function of the cerebellum? (biology only)

What is the function of the cerebellum? (biology only)

Involved in:

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

What is the function of the medulla oblongata? (biology only)

What is the function of the medulla oblongata? (biology only)

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

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

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

- CT scan
- PET scan

What is a CT scan? (biology only/higher)

What is a CT scan? (biology only/higher)

A procedure that uses X-rays to produce 3D cross-sectional images of the brain

Describe how CT scans are useful to investigate brain function (biology only/higher)

Describe how CT scans are useful to investigate brain function (biology only/higher)

- CT scans show damaged regions of the brain e.g. areas of swelling, bleeding
- Observations of the patient's symptoms can enable scientists to determine the function of the damaged region

What does a PET scan involve?
(biology only/higher)

What does a PET scan involve? (biology only/higher)

- Radioactive substance injected into a patient's bloodstream and taken up by tissues in the brain
- Radiation emitted by tissues detected, enabling the identification of active and inactive regions of the brain

Describe how PET scans are useful to investigate brain function (biology only/higher)

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- Show which areas of the brain are active and which areas are not
- Comparisons of brain activity in healthy patients and patients with brain damage allow scientists to determine the functions of inactive regions

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

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

- Damage to neurones is permanent and cannot be repaired (as nerve cells don't divide by mitosis)
- Hard to reach some areas of the brain
- Risk of further permanent damage to other areas of the CNS during surgery

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 are neurones?

What are neurones?

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

What is the function of the axon?

What is the function of the axon?

- Carries impulses away from the cell body
- Enables the transmission of nerve impulses over long distances

What is the function of the dendrites and dendrons?

What is the function of the dendrites and dendrons?

- Carry impulses towards the cell body
- Dendrites provide a large surface area to receive impulses

What is the role of the myelin sheath?

What is the role of the myelin sheath?

- Electrically insulating layer
- Surrounds the axon and increases the speed of impulses

Outline the function of a sensory neurone

Outline the function of a sensory neurone

Carries impulses from receptors to the central nervous system

Describe the structure of a sensory neurone

Describe the structure of a sensory neurone

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

Outline the function of a motor neurone

Outline the function of a motor neurone

Carries impulses from the central nervous system to effectors

Describe the structure of a motor neurone

Describe the structure of a motor neurone

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

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

Describe the structure of a relay neurone

Describe the structure of a relay neurone

- **Short dendrites** carry impulses from sensory neurones to the cell body
- **Short axon** carries impulses from the cell body to motor neurones

Describe how the central nervous system coordinates a response to a stimulus

Describe how the central nervous system coordinates a response to a stimulus

- Stimulus
- Sensory receptor detects stimulus
- Sensory receptor sends impulses along sensory neurone to CNS
- CNS coordinates response
- CNS sends information to effector along motor neurone
- Effector produces a response to the stimulus

What is a synapse?

What is a synapse?

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

How are nerve impulses transmitted across a synapse?

How are nerve impulses transmitted across a synapse?

- Nerve impulse reaches presynaptic neurone
- This triggers the release of neurotransmitters
- Neurotransmitters diffuse across the synapse
- They bind to receptors on the postsynaptic neurone
- This stimulates an impulse in the postsynaptic neurone

Why do synapses slow down the transmission of nerve impulses?

Why do synapses slow down the transmission of nerve impulses?

It takes time for the neurotransmitters to diffuse across the synapse and bind to receptors on the postsynaptic neurone.

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 e.g. a withdrawal reflex is initiated when a hot object is touched to prevent burns

Describe the reflex arc

Describe the reflex arc

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