OCR (B) Biology GCSE

Topic B5.2: How does the nervous system help us respond to change?

Flashcards

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?

What is the central nervous system?

Brain and spinal cord

What are neurones?

What are neurones?

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

Outline the function of a sensory neurone

Outline the function of a sensory neurone

Carries impulses from receptors to the central nervous system

Outline the function of a motor neurone

Outline the function of a motor neurone

Carries impulses from the central nervous system to effectors

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

Describe how neurones are adapted for the transmission of nerve impulses

Describe how neurones are adapted for the transmission of nerve impulses

- Long axon carries impulses rapidly away from the cell body and enables transmission over large distances
- Myelin sheath (electrically insulating layer) surrounds the axon and increases the speed of impulses
- Dendrites (extensions from the cell body) provide a large surface area to receive impulses

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

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

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 how the reflex arc may be overridden

Describe how the reflex arc may be overridden

- Reflex arcs can be deliberately overridden. This involves the conscious part of the brain.
- A neurone that connects to the motor neurone in the reflex arc sends impulses which interfere with reflex action. This prevents the normal effector response.

Describe the structure of the brain (biology only)

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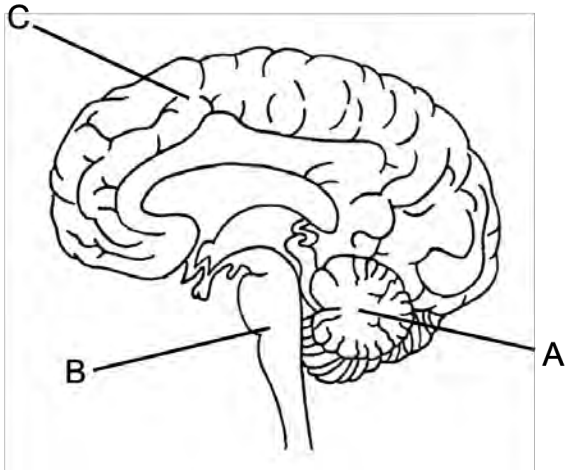
Consists of three main regions:

- Cerebral cortex
- Cerebellum
- Medulla oblongata (brain stem)

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



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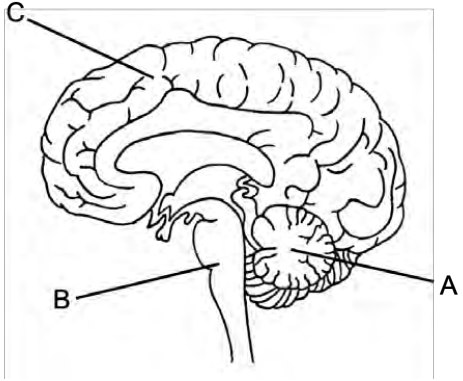

A = cerebellum

B = medulla oblongata (brain stem)

C = cerebral cortex

Describe the structure of the cerebral cortex (biology only)

Describe the structure of the cerebral cortex (biology only)

- Outer layer of nerve cell bodies
- Divided into two hemispheres
- Highly folded forming ‘wrinkles’

What is the function of the cerebral cortex? (biology only)

What is the function of the cerebral cortex? (biology only)

Involved in:

- Conscious thought processes
- Intelligence
- Language
- Memory
- Emotion

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 brain stem? (biology only)

What is the function of the brain stem? (biology only)

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

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

Why is it difficult to study the brain? (biology only/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

Outline the methods used by scientists to study the brain (biology only, higher)

Outline the methods used by scientists to study the brain (biology only/higher)

- Comparisons of patients with brain damage to healthy individuals enable scientists to identify the functions of specific areas of the brain.
- Observing how the electrical stimulation of certain areas of the brain affects an individual
- fMRI scans enable the identification of greater brain activity when performing specific tasks due to increased blood flow

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

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It is difficult to get informed consent from severely brain damaged patients.

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

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

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