

The brain and hormonal control: practice questions

8 questions · 28 marks · mark scheme at the back

For Pearson Edexcel International AS Biology XBI11 and International A Level Biology YBI11. **A Level only** is IA2 content (Units 4 to 6), not needed for the International AS.

Name

Total / 28

1 UNIT 5 STYLE [1 mark]

Damage to which part of the brain would be most likely to stop breathing and heart rate being controlled?

- A. ☐ Cerebellum
- B. ☐ Hypothalamus
- C. ☐ Medulla oblongata
- D. ☐ Cerebral hemispheres

2 UNIT 5 STYLE [4 marks]

Compare and contrast nervous and hormonal coordination in animals.

3 UNIT 5 STYLE [4 marks]

Describe the roles of the hypothalamus and the pituitary gland in coordination.

4

UNIT 5 STYLE

[4 marks]

Suggest which scanning technique would be most suitable for each of the following, giving a reason in each case. (a) Finding bleeding in the brain of a patient after a head injury. (2) (b) Finding which regions of the brain are active when a patient is reading aloud. (2)

5

UNIT 5 STYLE

[5 marks]

Evaluate the use of MRI rather than CT to investigate a suspected brain tumour.

6

UNIT 5 STYLE

[4 marks]

Explain how a lack of dopamine causes the symptoms of Parkinson's disease and how L-DOPA helps to relieve them.

7

UNIT 5 STYLE

[3 marks]

A drug used to treat depression stops serotonin being taken back into the presynaptic neurone. Explain how this may reduce the symptoms of depression.

8

UNIT 5 STYLE

[3 marks]

A person with damage to the cerebellum has normal muscle strength and can understand speech, but their movements are jerky and they cannot keep their balance. Explain these symptoms.

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

C C (1) The medulla oblongata controls heart rate and breathing.

2. [4]

- similarity: both involve chemicals / act on effectors / target specific cells (1)
- nervous is fast, hormonal is slower (1)
- nervous transmitted by neurones (impulses), hormonal transmitted in the blood (1)
- nervous effects short-lived, hormonal effects longer-lasting (1)
- nervous acts on specific effectors, hormones act on any target cells with receptors (1)
- Max 4

3. [4]

- hypothalamus monitors blood / body conditions such as temperature or water content (1)
- hypothalamus produces releasing hormones / controls the anterior pituitary (1)
- hypothalamus makes ADH, which is released from the posterior pituitary (1)
- pituitary secretes hormones that act on target glands / tissues (1)
- so links the nervous and endocrine systems (1)
- Max 4

4. [4]

- (a) CT (1)
- quick / shows bleeding and bone / widely available in emergencies (1)
- (b) fMRI (1)
- detects changes in blood flow / oxygen use in active areas, as the patient performs the task (1)

5. [5]

- MRI gives more detailed images of soft tissue (1)
- so smaller tumours / their boundaries are seen more clearly (1)
- MRI uses no ionising radiation, so can be repeated safely; CT uses X-rays (1)
- MRI is slower, more expensive and less widely available than CT (1)
- MRI cannot be used for patients with a pacemaker / metal implants (1)
- reasoned conclusion, e.g. MRI is better for diagnosing and locating the tumour, but CT may be used when MRI is unavailable or unsafe for the patient (1)
- Max 5

6. [4]

- neurones that make dopamine (in the brain) are lost / die (1)
- so less dopamine is released at synapses / less transmission in the regions that control movement, causing tremor and rigidity (1)
- L-DOPA crosses the blood-brain barrier (dopamine cannot) (1)
- L-DOPA is converted to dopamine in the brain, restoring transmission (1)

7. [3]

- serotonin stays in the synaptic cleft for longer / concentration of serotonin in the cleft increases (1)
- serotonin binds to receptors on the postsynaptic membrane more often / for longer (1)
- so synaptic transmission is increased, which counteracts the low serotonin activity linked to depression (1)

8. [3]

- the cerebellum coordinates movement (1)
- and balance / posture, using information from muscles, joints and the ear (1)
- the motor areas of the cerebral hemispheres and the muscles are undamaged / muscles can still contract, so muscle strength is normal (1)