6.7 Plasticity and Functional Recovery of the Brain: 10-minute Pack

AQA 7182 · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions.

1 Define 'synaptic plasticity' in the context of brain function and learning.

(Total for Question 1 is 1 mark)

2 Identify a causality limitation in Maguire et al. and propose a design to address it.

(Total for Question 2 is 2 marks)

3 Outline one key finding from Maguire et al. (2000) about London taxi drivers that illustrates experience-dependent plasticity.

(Total for Question 3 is 2 marks)

4 Explain how long-term potentiation contributes to synaptic plasticity and learning at the cellular level.

(Total for Question 4 is 3 marks)

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Mark scheme · 6.7 Plasticity and Functional Recovery of the Brain: 10-minute Pack

Question 1

a concise definition that synaptic plasticity is the brain's ability to change the strength or number of synaptic connections in response to experience or learning oe **B1**

Answer: The brain's ability to change the strength or number of synaptic connections due to experience or learning.

Question 2

identifies the limitation that the study is correlational/cross-sectional so it cannot establish whether being a taxi driver caused hippocampal enlargement or individuals with larger hippocampi become taxi drivers oe **B1**

proposes a suitable design change, e.g. a longitudinal study measuring hippocampal volume before and after taxi training or a prospective study following trainees over time oe **B1**

Answer: Limitation: the study is correlational so it cannot show causation. Design change: use a longitudinal or prospective study measuring hippocampal volume before and after taxi training to track changes over time.

Question 3

states that taxi drivers had greater posterior hippocampal volume compared with control participants oe **M1**

links this to experience-dependent plasticity, e.g. the result is associated with extensive spatial navigation experience oe **A1**

Answer: Taxi drivers were found to have increased posterior hippocampal volume compared with controls, a difference linked to their extensive spatial navigation experience.

Question 4

states that LTP is a long-lasting increase in synaptic strength following repeated stimulation of a synapse oe **M1**

explains that repeated stimulation increases neurotransmitter release and receptor sensitivity at the synapse oe **A1**

links this to learning by stating stronger synaptic connections make transmission of the relevant neural signal more likely, supporting memory formation oe **A1**

Answer: LTP is a long-lasting increase in synaptic strength after repeated stimulation; it increases neurotransmitter release and receptor sensitivity so the synapse transmits signals more effectively, supporting learning and memory.

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