

UNIVERSITY OF LONDON
NEUROSCIENCE MSc EXAMINATION

**For Internal Students of the
INSTITUTE OF PSYCHIATRY
King's College London**

4th December 2009 at 10:00 am - 12:30 pm

PAPER AI

Answer FOUR questions only

- 1 What are the relative merits of mouse models and human subjects for studying the mechanisms of neurodegenerative diseases?

- 2 Describe how astrocytes regulate potassium and glutamate during neuronal activity.

- 3 (i) What do you understand by the term “receptor reserve”, also known as “spare receptors”. Using concepts of drug affinity and efficacy, explain how it arises and under what circumstance does the “reserve” disappear? and (ii) What is an inverse agonist and why does it depend on constitutively active receptors?

- 4 Describe the sequence of events surrounding the generation of, and recovery from, an action potential in a neuron. Be sure to discuss the roles of: (i) external inputs, (ii) K^+ and Na^+ ions, (iii) voltage-gated ion channels, (iv) the importance of the relative time courses of Na^+ and K^+ ion conductances and (v) the absolute refractory period.

- 5 Discuss the promises and pitfalls of the use of *in vivo* microdialysis for monitoring neurochemical changes during animal behaviour.

- 6 Describe the structure and function of trimeric G Proteins.

- 7 Why are insulin and Wnt signaling thought to be important in Alzheimer's disease?

- 8 Amyotrophic lateral sclerosis (motor neuron disease) and frontotemporal dementia represent two ends of a phenotypic spectrum.
Discuss the clinical, genetic and pathological basis for their links?

- 9 What clinical and pathological features are shared between the polyglutamine disorders? How do they differ from each other?

- 10 What is the rationale behind stem cell therapy and its chances of success in different forms of Batten disease?