

UNIVERSITY OF LONDON
NEUROSCIENCE MSc EXAMINATION

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

11th February 2011 at 09:00 - 11:30

PAPER A1

Answer FOUR questions only

1. What are the principles of stereology and why are these important for studying neurodegeneration?
2. Describe the structure of CNS myelin, giving its major constituents and their functions.
3. How can carbon fibre electrodes be used to measure dopamine release? Explain the contribution of carbon fibre electrodes to: (a) the study of exocytosis and (b) dopamine release in response to animal behaviour.
4. State whether the following ions are predominantly extracellular or intracellular and give their approximate equilibrium potentials: Na^+ , K^+ , Cl^- and Ca^{2+} . Describe the consequences of opening channels for each of these ions, the physiological circumstances under which the channels open and the effects of the resulting ion currents on the membrane potential.
5. Discuss the role of G proteins in receptor function.
6. Compare and contrast how hormone receptors and Notch receptors turn on gene transcription.
7. As a neuroscience researcher, how might knowledge of RNA interference be useful to you?
8. The basal ganglia act as a filter of movements: describe this function and illustrate with examples what happens when this function is lost.
9. What are the limitations that currently prevent enzyme replacement therapy being effective for CNS lysosomal storage disorders?
10. You have identified a variant in a candidate gene in a patient with a familial neurodegenerative disease. What would be your approach to experimentally testing whether it is likely to be pathogenic using bioinformatic, genetic and cell biology tools?