

NEUROSCIENCE MSc EXAMINATION

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

21st March 2011 10:00 - 12:30

Developmental Neurobiology

PAPER B3

Answer **FOUR** questions only

1. Critically evaluate the evidence for and against the default model of neural induction.
2. Compare the strengths and weaknesses of the mouse and the zebrafish as genetic model organisms (40%). Which genetic approach has been very successful in zebrafish? Describe the technique and explain the reasons of its success (30%). Which genetic approach has been very successful in mouse? Describe the technique and explain the reasons of its success (30%).
3. How is a continuous ventral-dorsal gradient of the morphogen Sonic Hedgehog translated into distinct neuronal identities?
4. Using a specific example, describe the molecular and cellular events that ensure specificity during connectivity between motor neurons and their target cells and explain how this example relates to the neurotrophic hypothesis.
5. How does the realization that dendrites target their growth using known "axon guidance" molecules change our thinking about circuit development?
6. Phosphoinositides in the cell membrane are substrates and binding sites for several signalling molecules. Give a brief example of one enzymatic activity that changes the phosphoinositides content at the cell membrane with subsequent cellular consequences and how these regulate neuronal morphogenesis.
7. Discuss how neural progenitor cell fate can be influenced by both intrinsic and extrinsic mechanisms.
8. How important is patterned neuronal activity for the development of the visual system?