

KING'S COLLEGE LONDON
INSTITUTE OF PSYCHIATRY, PSYCHOLOGY AND NEUROSCIENCE

MSc NEUROSCIENCE EXAMINATION

16th March 2015 at 14.00-16.30pm

Developmental Neurobiology

B3 WRITTEN EXAMINATION

Answer FOUR questions only

1. How are GABAergic neurons of the thalamus generated? What are the behavioural consequences if they are defective?
2. By defining what is meant by receptive field, retinal mosaic and parallel processing, discuss the nature of information sent from the retina to the brain.
3. Discuss asymmetric division and how cells can achieve asymmetry. What are the potential consequences of mis-regulated symmetry and/or asymmetry of divisions in the developing brain?
4. Critically review the evidence that both dynamic microtubules and actin filaments in filopodia are important for neuriteogenesis.
5. Discuss the combinations of morphogens required to generate spinal motor neurons from ES cells in cell culture. Propose an experiment aimed at shifting the usual cervical identity of ES cell-derived motor neurons to either a thoracic fate or a lumbar (hindlimb-level) fate - select one fate.
6. Explain how competitive forms of plasticity, such as LTP/LTD, could destabilise the activity levels of a network and describe the multiple strategies employed by neurons to compensate for this. How is this achieved without losing the information content arising from the LTP/LTD modifications?
7. Explain the mechanism of receptor activation and signalling for a NAMED family of secreted signalling proteins. Discuss how they are used to direct multiple aspects of neural development.
8. The retinotectal projection and the olfactory projection are prototypes for continuous and discrete topographic maps. Explain and compare the principles of formation of these maps.