

NEUROSCIENCE MSc EXAMINATION

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

8th March 2012 10:00 - 12:30

PAPER B3 Developmental Neurobiology

Answer FOUR questions only. Use experimental data to support your arguments where appropriate

1. What do we know about the mechanisms of asymmetric division in the vertebrate neural tube and what do we need to know to understand it better?
2. Which developmental mechanisms subdivide the telencephalon into subpallium and pallium? What are the signals involved and how do they act?
3. Explain the differences in neural mapping principles in the visual and olfactory systems.
4. Describe the basic principles of a microarray experiment and how it is used to find differentially expressed genes between biological samples.
5. Weiss proposed that axons grew in random directions in embryos and that only those connections that are functionally appropriate are retained. Is he correct?
6. Why do neurons have an axon initial segment?
7. In the developing forebrain different types of neurons are generated from different progenitor cell populations. Discuss this statement.
8. A research scientist is working on the function of a novel transcription factor CEX^1 in neural stem cells (NSCs). They have a NSC line (*in vitro*) and an antibody that recognises protein X and would like to investigate the following:
 - 1) where X binds throughout the genome
 - 2) how the transcriptome changes when expression of X is up- or down-regulated.Describe the experiments that they could perform to obtain the data required, explaining the rationale and mechanisms involved where possible.