KING'S COLLEGE LONDON

INSTITUTE OF PSYCHIATRY, PSYCHOLOGY AND NEUROSCIENCE

MSc NEUROSCIENCE EXAMINATION

16th March 2015 at 14.00-16.30pm

Neural Stem Cells and Nervous System Repair

B8 WRITTEN EXAMINATION

Answer FOUR questions only

1. Discuss how the epigenome shapes neural stem cell differentiation potential.

2. You are characterizing a transgenic mouse exhibiting a significantly lower level of adult hippocampal neurogenesis (AHN).

   a) Discuss one molecular mechanism that could be involved in this alteration.

   b) Which two behaviours are you going to prioritize characterizing in these mice?

   Justify your choices.

3. Critically evaluate the following statement*: "Thousands of people have received stem cell transplants after spinal cord injury, but we still don't know which are safe or effective therapies."*

4. What are induced pluripotent stem cells and how would you apply this technology to study autism spectrum disorder?

5. Explain the process of neurogenesis in Drosophila at the cellular level and discuss how defects in neurogenesis can cause tumours in the Drosophila brain.

6. To what extent do oxidative stress and excitotoxity share common mechanisms in causing neuronal damage? What are the protective measures that can be taken to attempt to reduce such effects?

7. Critically evaluate the potential modes-of-action of neural stem cells in brain repair.

8. Discuss the advantages and disadvantages of imaging the host tissue environment using standard MRI and PET methodology as a proxy measure of brain repair following stem cell grafting, for example in patients with Parkinson's disease.