

## Essay Questions 2009

### Module 1 Essay – Submission Deadline 18:00 on 5<sup>th</sup> January 2009 Submission must be made using Moodle

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|----|---|-----------------|
| 1  | Describe the mechanisms of microtubule-dependent transport in dendrites   | Jean-Marc Gallo |
| 2  | Is the neuronal doctrine still valid for our understanding of functional neuroanatomy in the 21st century?                                  | Nadeem Khan     |
| 3  | Compare and contrast how neural crest cells are directed along a melanoblast, sensory or sympathetic lineage.                               | Brenda Williams |
| 4  | What are the basic principles which underlie unbiased stereology and why are these particularly important for studying the diseased brain?  | Jon Cooper      |
| 5  | Detail what methodological approaches can be utilised to evidence neurodegenerative disease and dysfunction at a cellular and system level. | Nadeem Khan     |
| 6  | Discuss the role of graded molecules along the axes of the retina and their roles in topographic mapping in the brain.                      | Sandrine Thuret |
| 7  | Describe how astrocytes communicate with each other.  | Arthur Butt     |
| 8  | Describe the functional properties of splice isoforms of tau.   | Jean-Marc Gallo |
| 9  | Discuss the mechanisms that regulate the temporal and spatial generation of neuronal diversity during neurogenesis.                         | Dafe Uwanogho   |
| 10 | What mechanisms might be involved in functional repair of brain damage by stem cells? How might these mechanisms be investigated?           | Helen Hodges    |

**Module 2 Essay – Submission Deadline 18:00 on 26<sup>th</sup> January 2009**  
**Submission must be made using Moodle**

- 1 Discuss cortico-striatal pathology in neuropsychiatric disorders in the context of functional segregation in these anatomical systems. Anastasia Christakou
- 2 Discuss the advantages of studying molecular mechanisms of learning and memory in mutant mouse models as compared to studies with wild-type animals. Keiko Mizuno
- 3 Microtubules and neurofilaments are major structural components of the neuronal cytoskeleton. Describe how each of these components is affected in degenerating neurons. Diane Hanger
- 4 The fruitfly *Drosophila* can be used to screen for molecules that are potential inhibitors of neurodegeneration. Please outline background, experimental set-up, analysis and interpretation. Frank Hirth
- 5 How do the genetics of complex and Mendelian disorders differ? Illustrate your answer with examples from degenerative and demyelinating disorders. John Powell
- 6 Glial activation is a consequence of neuron loss: how true is this statement in lysosomal storage disorders? Jon Cooper
- 7 Discuss the role of monoamine transporters for the behavioural effects of cocaine and amphetamine. Christian Muller
- 8 Compare and contrast supervised and unsupervised learning algorithms in artificial neural networks. Mike Coleman
- 9 With ageing the slow afterhyperpolarization (sAHP) increases in hippocampal pyramidal neurons. Discuss whether or not restoration of the age-related changes in the sAHP can prevent age-associated learning deficits. Peter Giese
- 10 There are many mechanisms for controlling gene expression. Describe SIX different mechanisms that impact significantly on the temporal and spatial expression of proteins and therefore alter cell function. Angela Hodges

**Module 3 Essay – Submission Deadline 18:00 on 23 February 2009**  
**Submission must be made using Moodle**

- 1 Is fMRI able to provide any useful clinical insights in psychiatry that are not available by other means? Mike Brammer
- 2 Describe the evidence that mutant protein aggregation is pathogenic in some autosomal dominant forms of familial Parkinson and motor neuron diseases. Christopher Shaw
- 3 Schizophrenia and bipolar disorder have been considered to be separate diagnostic entities. Describe how molecular genetics might change this dichotomy. David Collier
- 4 Compare and contrast the clinical aspects of Alzheimer's disease and vascular dementia. Lia Ali
- 5 Critically appraise the following: "Affective disorders should be treated by psychological rather than pharmacological therapies". Paul Morrison
- 6 What is the evidence for a genetic contribution to human personality? Are there any convincing molecular genetic findings linking specific genes to a human personality trait? John Powell
- 7 The glutamate hypothesis of schizophrenia now rivals that of dopamine as a neurochemical model of the illness. Discuss. James Stone
- 8 Discuss how molecular and cellular MRI contribute to our understanding of neurodegeneration disease. Mike Modo
- 9 What are the problems and promises of a neuroimaging approach to psychiatric genetics? Ulrich Ettinger
- 10 What are the clinical implications of pharmacogenetics for psychiatry? Maria Arranz

**Module 4 Essay – Submission Deadline 18:00 on 16<sup>th</sup> March 2009**  
**Submission must be made using Moodle**

- 1 How can experiments using cultures of glial cells inform us about the development of immune reactions in vivo? What limitations do such culture systems have? David Male
- 2 Discuss the advantages and disadvantages of the brain sampling technique microdialysis. Explain how microdialysis can be used to explore the regulation of a neurotransmitter pathway. Martyn Boutelle
- 3 Discuss some of the non-immune functions of cytokines within the CNS. Payam Rezaie
- 4 Discuss the structure function relationship in voltage-gated and ligand-gated ion channels. Andrew Wong
- 5 Discuss how cloning and sequencing of receptor genes has contributed to our understanding of their function. Andrew Makoff
- 6 What can chronic relapsing experimental autoimmune encephalitis (CREAE) teach us about the aetiology and pathogenesis of multiple sclerosis? David Male
- 7 Describe in detail the structure and function of monomeric and trimeric G proteins giving examples of the signal transduction pathways in which they are involved. Iain Campbell
- 8 Microglia are tissue-resident macrophages. Discuss the evidence for and against this concept. Payam Rezaie
- 9 Describe the mechanisms by which neurotrophins regulate apoptosis during neuronal development. Jean-Marc Gallo
- 10 Compare and contrast the different ways in which cells signal to one another and discuss the relevance of cell signalling to neurological disease. Richard Killick