

2008 essay questions

Essay I Deadline 11th February 2008

	Question	Author
1	What are the relative advantages and limitations of using mice to model neurodegenerative diseases?	Jonathan Cooper
2	Describe the principles of stereology and why these are particularly important for studying neurodegenerative disorders.	Jonathan Cooper
3	Compare and contrast the main pathological features of alpha-synucleinopathies	Nadeem Khan
4	Discuss how physiological properties of astrocytes show they are more than 'brain glue'.	Arthur Butt
5	Discuss the roles of symmetric and asymmetric division in nervous system development.	Dafe Uwanogho
6	Discuss the importance of the mid-hindbrain boundary formation during brain development.	Sandrine Thuret
7	Discuss the molecular mechanisms behind the different origins and modes of migration of excitatory and inhibitory neurones in the developing cerebral cortex.	Brenda Williams
8	What are the potential risks of using stem cell grafts for the treatment of CNS diseases and disorders? How might these be overcome?	Helen Hodges
9	Review the mechanisms of transduction of axonal guidance signals to the growth cone cytoskeleton.	Jean-Marc Gallo
10	How does Notch signaling mediate lateral inhibition? How is this mechanism thought to regulate timing in neurogenesis?	Jack Price

Essay II Deadline 3rd March 2008

	Question	Author
1	Describe the learning algorithms used with 3 different types of artificial neural networks.	Mike Coleman
2	Discuss the role of animal models in the identification of novel pharmacotherapies for nicotine dependence, indicating the main strengths and limitations of the models.	Ian Stolerman
3	The fruitfly <i>Drosophila</i> has been successfully used to study human neurodegenerative diseases. Discuss this statement and illustrate your answer with recent examples.	Frank Hirth
4	Describe how the gate control theory can account for pain without damage (e.g. phantom limb pain) or damage without pain (e.g. injuries during war time)	Anna Battaglia
5	Describe face, construct and predictive validity for a behavioural model, giving specific examples for each type of validation.	Cathy Fernandes
6	Using two hormonal systems as examples, describe the functioning of the anterior pituitary, the associated target organs and the feedback loops which regulate the processes	Iain Campbell
7	Discuss the molecular mechanisms of apoptotic cell death and the role of such cell death in neuro-biology.	Claudie Hooper
8	Describe the various cellular functions that have been proposed for presenilin 1, and discuss how mutations in presenilin 1 may lead to the most aggressive forms of Alzheimer's disease.	Salvador Soriano
9	Discuss the evidence showing that changes in the tau protein contribute to neurodegenerative diseases, including Alzheimer's.	Wendy Noble
10	Discuss the role of CaMKII (calcium/calmodulin-dependent kinase II) autophosphorylation in learning and memory.	Karl Peter Giese

Essay III Deadline 28th April 2008

	Question	Author
1	Critically review the results of transcriptome profiling using DNA microarrays in schizophrenia. Are there any consistent findings?	John Powell
2	What are the limitations of current antidepressant and anxiolytic medications and how might better medicines be developed?	Paul Morrison
3	How might PET (positron emission tomography) and fMRI be used together in the development of potential new drugs.	Mike Brammer
4	Review the evidence for a genetic contribution to personality. Are there any convincing molecular genetic findings linking specific genes to a human personality trait?	John Powell
5	How does molecular imaging contrast with conventional imaging and help us understand neurodegenerative disease?	Mike Modo
6	Why is the limbic system important for emotional regulation and how might abnormalities give rise to anxiety and depression?	Paul Morrison
7	Discuss the possible role of dopamine in incentive salience. How might this lead to some of the symptoms of schizophrenia?	James Stone
8	Compare and contrast latent inhibition and prepulse inhibition as animal models of schizophrenia.	Veena Kumari
9	Describe what you understand by whole genome association, highlighting how this differs from traditional linkage and association analysis	David Collier
10	What aspects of neural transplantation can be understood by in vivo neuroimaging rather than histological analysis?	Mike Modo

Essay IV Deadline 2nd June 2008

	Question	Author
1	The concept of a 'neurovascular unit' is starting to supercede the traditional view of the blood brain barrier. Explain what these terms mean highlighting how they are different.	David Male
2	Discuss the following statement: 'Immune reactions in the CNS are mostly irrelevant in protecting the CNS against viral infection.'	David Male
3	Describe how a cortico-striatal thalamo-cortical circuit might control normal movements and how its dysfunction might give rise to the characteristic symptoms of Parkinson's disease and Huntington's chorea. Describe how dysfunction of a related circuit might give rise to symptoms of schizophrenia symptoms.	John Stephenson
4	Systemic infection and inflammation exacerbates the symptoms and drives the progression of neurodegenerative disorders. Discuss the mechanisms underlying this.	Payam Rezaie
5	Describe in detail the structure and function of monomeric and trimeric G proteins and how they have been investigated. Illustrate your answer by showing how the different G-proteins function in specific signal transduction cascades	Iain Campbell
6	Increased phosphorylation of a protein could be due, in principle, to increased kinase activity or to decreased phosphatase activity. Using this principle, evaluate critically the evidence of how tau becomes hyperphosphorylated in Alzheimer's disease and other tauopathies	Hugh Reynolds
7	How would you purify a receptor and what molecular biological approaches would you use to obtain its amino acid sequence?	Iain Campbell
8	RNA splicing and RNA editing are important post-transcriptional events that affect many receptor genes. Discuss how these changes affect receptor function.	Andrew Makoff
9	Describe excitotoxicity from the perspective of cell signalling.	Hugh Reynolds
10	Microglia are dynamic cells that act as pathological sensors within the adult nervous system. Discuss this statement in relation to normal homeostasis and the pathophysiological roles of these cells.	Payam Rezaie