

# MSc Neuroscience at the Institute of Psychiatry

## 2005 Essay titles

### Section I

	Question	Author
1	What are the relative limitations and advantages of using human autopsy material vs. animal models to study neurodegenerative disease?	Jonathan Cooper
2	Describe the likely mechanism by which anti-cholinesterases act in the treatment of Alzheimer's disease.	Brian Anderton
3	"Drosophila can be successfully used study human neurodegenerative diseases" Discuss this statement - illustrate your answer with suitable examples.	Amrit Mudher
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	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	What is the theoretical basis for the belief that drug discrimination methodology provides animal models for the subjective effects of psychoactive drugs? Discuss whether the evidence from both human and animal experiments supports or refutes such interpretations.	Ian Stolerman
7	Review the mechanisms of transduction of axonal guidance signals to the growth cone cytoskeleton.	Jean-Marc Gallo
8	Microglia are involved in neuroregeneration. Discuss this statement in the context of evidence obtained from studies in vitro and in vivo.	Payam Rezaie
9	Discuss the molecular mechanisms and structural changes that might contribute to long term potentiation at a synapse	John Stephenson
10	How does Notch signaling mediate Lateral Inhibition? How is this mechanism thought to regulate timing in neurogenesis?	Jack Price

## Section II

	Question	Author
1	Describe the relevance of neuronal intermediate filaments to motor neuron disease.	Diane Hanger
2	Discuss potential strategies for treating multiple sclerosis, focussing on whether the therapeutic target(s) should be within the CNS or outside the CNS.	David Male
3	Compare and contrast the pathological features of Alzheimer's disease and Pick's disease.	Nadeem Khan
4	Describe in detail the functioning of the hypothalamic -pituitary axis. Include a brief description of each of the hormonal systems that are involved	Iain Campbell
5	Describe the role of glia in supporting action potential propagation in CNS axons.	Arthur Butt
6	Compare and contrast, indicating relationships where possible, the phenomenology (biological, genetic, neuropathological), incidence and aetiology of scrapie, CJD and BSE.	Stephen Whatley
7	How does molecular imaging contrast with conventional imaging?	Mike Mado
8	Spinal muscular atrophy due to SMN1 deletion and familial amyotrophic lateral sclerosis due to SOD1 mutation are genetic disorders that affect motor neurones. Compare and contrast them with reference to their clinical features, pattern of inheritance, and the molecular mechanisms underlying motor neurone degeneration.	Christopher Shaw
9	RNA splicing and RNA editing are important post-transcriptional events that affect many receptor genes. Discuss how these changes affect receptor function.	Andrew Makoff
10	Describe two specialised celltypes of the mammalian retina and comment on their functional adaptations	Paul Chapple

### Section III

	Question	Author
1	Describe the learning algorithms used with 3 different types of artificial neural networks.	Mike Coleman
2	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
3	Of the 30000 or so mammalian genes, roughly 2/3 are of completely unknown function. Discuss some approaches currently used to find the functions of uncharacterised genes and unknown functions of 'known' genes. How many of these would you guess are involved in the development and operation of the central nervous system?	Leo Schalkwyk
4	"Mood and anxiety disorders have a common neurobiological basis" - Discuss this statement citing evidence for and against from the human, animal and in vitro literature.	Mike Travis
5	How might PET (positron emission tomography) and dMRI be used together in the development of potential new drugs.	Mike Brammer
6	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
7	Discuss the evidence implicating neuregulin 1 as a susceptibility gene for schizophrenia. Is it a biologically plausible susceptibility gene?	David Collier
8	Describe the potential therapeutic options for the treatment of the neuronal ceroid lipofuscinoses and which of these options may be suitable for different forms of this disorder.	Jonathan Cooper
9	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
10	Describe the different modes of migration in the developing cerebral cortex; include mechanisms where appropriate.	Brenda Williams