

- (1) What is an oncogene? What is the minimal genetic requirement for a primary cell to become a cancer? (10%)
- (2) The central dogma of a living cell follows DNA-RNA-protein sequences that are transcription and translation respectively. Please give one example of life event in which this dogma is distinctively not followed. (10%)
- (3) Please define "stem cells" and also give an example of the embryonic and adult stem cell. (10%)
- (4) Anti-sense technology and RNAi are common tools in order to shutdown or decrease expression of a specific gene. Please define them. (10%)
- (5) Integrin is a heterodimeric membrane protein constituted by α and β subunit. What is the ligand and function of integrin in general? (10%)
- (6) What is the major signal pathway involved in signal transduction of a peptide growth factor to exert effects on cell proliferation? (10%)
- (7) Three biomedical scientists won the 2002 Nobel prize in Physiology/Medicine. They are Sidney Brenner, John Sulston, and H. Robert Horvitz. What are their scientific contributions? A brief description is enough. (10%)
- (8) Please define genes that are associated with apoptosis? (10%)
- (9) The following methods are commonly used in studies of molecular and cell biology. They require the usage of cDNA probe or DNA primers. Please describe briefly the difference between these methods and what purposes of study can these methods achieve? (20%)
 - (a) In situ hybridization
 - (b) Northern blot
 - (c) RT-PCR
 - (d) Southern blot