

1. To activate the gene expression in eucaryotics, it is necessary to open the compacted chromatin for the recruitment of transcription factors. Describe the regulatory mechanism of chromatin-opening in eucaryotics. (10%)
2. Describe the signal pathways in mammalian cells when epidermal growth factors bind epidermal growth factor receptor. (10%)
3. Describe the ubiquitin-degradation systems in eukaryotic cells (10%).
4. Why does an inhibitor for DNA methyl transferase act as agent for cancer therapy? (10%)
5. Please describe the property of eukaryotic DNA and the general characteristics of human genes, and the biomedical significances of genome sequence project (10%)
6. Please describe briefly the types of DNA damage and the DNA repair systems used by cells to withstand alterations to DNA damages, and the molecular mechanism used by mammals to generating millions of different immunoglobulins (antibodies) with distinct binding specificities. (10%)
7. Please describe the methods for generating point (subtle) mutations with gene targeting (homologous recombination) techniques in transgenic mice. (10%)
8. Describe all the approaches to knock down gene expression at the RNA level and compare their advantages and disadvantages. (10%)
9. You suspect that a repeated sequence just upstream of a gene is acting as an enhancer. (10%)
  - 1). Describe and give the results of an experiment that would test your hypothesis.
  - 2). How to identify activator(s) that binds to an enhancer
10. Antibiotics have been used as tools to study the mechanisms of transcription and translation for a long time. Bicyclomycin is a novel antibiotic used for bacterial infection. Please design a series of experiments to identify the mode of action for bicyclomycin. (10%)