

試題共十五題，總分 100 分。請依題號順序於答案卷作答，未依序作答者不予計分。

一、選擇題；Multiple choices. Each question may have more than one answer. You must give all the correct answers to get 4 points for each question.

1. The major difference between EST sequencing and chromosomal sequencing is
 - A. Each EST clone sequence can be found in chromosomal sequence database
 - B. EST clone is a full-length sequence
 - C. Chromosomal sequencing is performed by shot-gun method
 - D. EST clone contains promoter sequence
2. You can predict a novel gene encoding for a secreted protein if this novel protein contains
 - A. signal peptide and transmembrane domain
 - B. no signal peptide and no transmembrane domain
 - C. signal peptide but no transmembrane domain
 - D. transmembrane domain only
3. Which of the following statement about pseudogene is **CORRECT**?
 - A. It does not contain promoter.
 - B. It does not contain intron
 - C. It may encode for functional protein
 - D. It may be transcribed into mRNA
4. Which of the following statement about the organization of the human genome is **TRUE**?
 - A. 1% of sequence is exon sequence.
 - B. 75% of sequence are repetitive sequence
 - C. It may encode for 100,000 proteins
 - D. Intron sequences may contain exon sequence
 - E. all the above four are true
5. Which of the following techniques can be used to detect tissue expression profile?
 - A. Northern blot analysis
 - B. Southern blot analysis
 - C. DNA microarray analysis
 - D. Restriction fragment length polymorphism (RFLP)
 - E. all the above four are true

(背面仍有題目,請繼續作答)

6. If overexpression of a specific gene is the pathogenesis of the cancer, which of the following drugs can be used to treat the disease?
- A. Monoclonal antibody against the protein
 - B. Interference RNA of the gene
 - C. Monoclonal antibody against the receptor of the protein
 - D. Gene therapy by delivery of the gene into body
 - E. Antisense RNA of the gene
7. You used PCR technique to amplify a piece of the gene and the result showed more than one band. Which of the following steps you should modify to increase the specificity of PCR reaction?
- A. Increase the annealing temperature.
 - B. Increase Magnesium concentration
 - C. Increase the concentration of dNTP
 - D. Change a longer primer pairs with higher melting temperature
 - E. All of the above four are true

二、問答題

8. You used a P^{32} -labeled cDNA of the X gene as a probe to detect tissue distribution of the X gene. The result showed three bands on liver tissue by the northern blot analysis. Please give the possible reasons (5 points)
9. Computer analysis predicted a 200 bp exon sequence from HTG (highthroughput genome) database. You used this 200 bp to search for EST sequence but failed to find this 200bp in all EST database. Please give all the possible reasons. (5 points)
10. The angiotensin-converting enzyme (ACE2) has been identified as the functional receptor for SARS virus on the cell membrane of the target cells. SARS viral genome (29,751 bp) contains genes for replicase, spike glycoprotein, membrane glycoprotein, small envelope E protein, nucleocapsid protein and several novel open reading frames. Based on the above information, please describe all the possible approaches to develop drugs or vaccine to treat SARS viral infection. (12 points)
11. Describe the current delivery systems for gene therapy (10%)
12. What is nanotechnology and its application on biomedical sciences? (10%)

13. Describe the recent advancement of cancer research on prevention, diagnosis, and therapy with modern biotechnology such as microarray, proteomics, etc. (10%)
14. Briefly describe the principle and application of the real time polymerase chain reaction (real time PCR). (10%)
15. Describe the procedure and application of the in situ hybridization technique. (10%)