國立成功大學 107 學年度碩士班招生考試試題

系　　所：臨床醫學研究所

考試科目：生物化學

考試日期：0206，節次：3

※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

一. 選擇題(45 分,每題 3 分)

1. In which one of the following tissues is glucose transport into the cell insulin dependent?
   A. Adipose
   B. Brain
   C. Liver
   D. Red blood cells
2. This protein factor identifies the promoter of protein-coding genes in eukaryotes.
   A. Pribnow box
   B. Rho
   C. Sigma
   D. TFIID
   E. U1
3. Which of the following is required for both prokaryotic and eukaryotic protein synthesis?
   A. Binding of the small ribosomal subunit to the Shine-Dalgarno sequence.
   B. fMet-tRNA
   C. Movement of the messenger RNA out of the nucleus and into the cytoplasm
   D. Recognition of the 5'-cap by initiation factors.
   E. Translocation of the peptidyl-tRNA from the A site to the P site
4. Which of the following is best described as cis acting?
   A. Cyclic AMP response element-binding protein
   B. Operator
   C. Repressor protein
   D. Thyroid hormone nuclear receptor
5. A physician would like to determine the global patterns of gene expression in two different types of tumor cells in order to develop the most appropriate form of chemotherapy for each patient. Which of the following techniques would be most appropriate for this purpose?
   A. Enzyme-linked immunosorbent assay
   B. Microarray
   C. Northern blot
   D. Southern blot
   E. Western blot
6. A patient suffering from chills, vomiting, and cramping was rushed to the emergency department. He had eaten wild mushrooms for dinner that he had picked earlier in the day. His symptoms are due to an inhibition of which of the following enzymes?
   A. RNA polymerase I
   B. RNA polymerase II

C. RNA polymerase III
D. Telomerase
E. DNA primase

7. TFIIIA is a necessary transcription factor for the synthesis of which class of molecules?
A. mRNA
B. rRNA
C. tRNA
D. hnRNA
E. microRNA

8. The major, defining difference between a type 1 diabetic and a type 2 diabetic is which of the following?
A. Weight
B. Ability to produce insulin
C. LDL levels
D. Blood glucose levels
E. Serum triglyceride levels

9. A deficiency in which of the following vitamins will lead to a functional folate deficiency?
A. Thiamine
B. Niacin
C. Riboflavin
D. B12
E. Vitamin C

10. A patient has been diagnosed with a melanoma, and molecular analysis has indicated that the tumor has sustained a loss of p16(INK4) activity (inhibitor of cyclin-dependent kinase 4). Such a gene would be best calssified as which of the following?
A. A dominant oncogene
B. A tumor suppressor
C. A proapoptotic factor
D. An antiapoptotic factor
E. A growth factor

11. Many anticancer drugs are given to patients in their nucleoside form, rather than the nucleotide form. Which enzyme below will be required in the conversion of deoxyguanosine to dGTP?
A. Primidine nucleoside phosphorylase
B. Deoxyguanosine kinase
C. Ribonucleotide reductase
D. Adenine phosphoribosyltransferase
E. 5'-nucleotidase

12. Which one of the following statements about amino acids and their metabolism is correct?
A .Free amino acids are taken into the enterocytes by a proton-linked transport system.
B. In healthy, fed individuals, the input to the amino acid pool exceeds the output.
C. Muscle-derived glutamine is metabolized in liver and kidney tissue to ammonia plus a gluconeogenic precursor.
D. The first step in the catabolism of most amino acids is their oxidative deamination.
E. The toxic ammonia generated from the amide nitrogen of amino acids is transported through blood as arginine.

13. Choose the ONE best answer. δ-Aminolevulinic acid synthase activity:
A. catalyzes the committed step in porphyrin biosynthesis.
B. is decreased by iron in erythrocytes.
C. is decreased in liver in individuals treated with certain drugs such as the barbiturate phenobarbital.
D. occurs in the cytosol.
E. requires biotin as a coenzyme.

14. A microarray experiment looking at genes expressed by a cell line both before and after differentiation of the line indicated 15 potential genes which were upregulated. A simple technique to enable the scientist to determine the temporal order of induced gene expression is which of the following?
A. Southern blot
B. Northern blot
C. Western blot
D. RFLP analysis
E. Microarray analysis

15.Which of the following is an enzyme that is activated by hydrolysis of a proenzyme form?
A. Heparin
B. Keratin
C. Lactase
D. Pepsin
E. Phenylalanine hydroxylase

二. 問答題(55 分)

1. Describe the following terms: (25 分)
A. Warburg effect
B. CRISPR-CAS9 systerm
C. Citric Acid Cycle
D. Pentose Phosphate pathway
E. Long noncoding RNA

2. Treatment of carbonic anhydrase with high concentrations of the mental chelator EDTA (ethylenediaminetetraacetic acid) results in the loss of enzyme activity. Propose an explanation.(6 分)
3. A trisaccharide unit of a cell-surface glycoprotein is postulated to play a critical role in mediating cell-cell adhesion in a particular tissue. Design a simple experiment to test this hypothesis. (6 分)
4. Antibodies have two identical antigen-binding sites. Remarkably, antibodies to the extracellular parts of growth-factor receptors often lead to the same cellular effects as does exposure to growth factors. Explain this observation. (6 分)
5. Ovalbumin is the major protein of egg white. The chicken ovalbumin gene contains eight exons separated by seven introns. Should ovalbumin cDNA or ovalbumin genomic DNA be used to form the protein in E.coli? why? (6 分)
6. Histones are proteins found in eukaryotic cell nuclei, tightly bound to DNA, which has many phosphate groups. The pI of histones is very high, about 10.8. What amino acid residues must be present in relatively large numbers in histones? In what way do these residues contribute to the strong binding of histones to DNA? (6 分)