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SIMPLE-CHOICE QUESTIONS 單選題

（Identify the correct statement. Gain two points for each correct question. 每題 2 分）

1. What is the principal product of fatty acid synthase system in animal cells?
   (A) palmitate
   (B) stearate
   (C) oleate
   (D) linoleate

2. Which residue of cyclooxygenase can be acetylated by aspirin?
   (A) Pro
   (B) Thr
   (C) Met
   (D) Ser

3. Which amino acid is not produced by the precursor of 3-phosphoglycerate?
   (A) serine
   (B) glycine
   (C) alanine
   (D) cysteine

4. Which enzyme makes creatine to phosphocreatine?
   (A) creatine synthase
   (B) creatine phosphatase
   (C) creatine kinase
   (D) creatine phosphorylase

5. Wobble allows some tRNA to recognize more than one codon, which codon in the followings is not commonly paired with G-C-I?
   (A) C-G-G
   (B) C-G-U
   (C) C-G-C
   (D) C-G-I

6. Eukaryotic gene expression can be regulated by extracellular and intracellular signals, which hormone of the followings does not bind to a steroid-type hormone receptor?
   (A) androgen
   (B) glucocorticoid
   (C) vitamin D
   (D) vitamin C

（背面仍有題目，請繼續作答）

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7. Which histone protein is not located in the nucleosome core?
   (A) H1
   (B) H2A
   (C) H2B
   (D) H3

8. Which of the following features does NOT belong to exonucleases?
   (A) can degrade DNA
   (B) degrade DNA just from one direction
   (C) degrade DNA direction by either 5'→3' or 3'→ 5'
   (D) called nucleases

9. Which type of DNA repair system does NOT commonly happen in *E.* coli?
   (A) mismatch repair
   (B) base-excision repair
   (C) direct repair
   (D) deletion repair

10. What type of protein is not commonly involved in transcriptional activation in eukaryotic cells?
   (A) TATA-binding protein
   (B) phosphatidylserine receptor
   (C) coactivator protein complexes
   (D) DNA-binding transactivators

11. Which enzyme is not commonly used in recombinant DNA technology?
   (A) type II restriction endonuclease
   (B) DNA ligase
   (C) reverse transcriptase
   (D) protein kinase

12. What are the net products of pentose phosphate pathway?
   (A) D-Ribose 5-phosphate and $NADP^+$
   (B) D-Ribose 5-phosphate and FDH_2
   (C) D-Ribose 5-phosphate and NADPH
   (D) D-Ribose 5-phosphate and NADH

13. Glyoxylate cycle serves as a mechanism for converting acetate to carbohydrate. Which of the following enzymes is not required for the glyoxylate cycle?
   (A) citrate synthase
   (B) malate dehydrogenase
   (C) fumarase
   (D) isocitrate lyase

14. Which enzyme catalyzes the irreversible reaction in the citric acid cycle?
    (A) malate dehydrogenase
    (B) fumarase
    (C) aconitase
    (D) citrate synthase

15. Which of the following transporters is responsible for fatty acid entrance into mitochondria in animal cells?
    (A) acyl-citrate/citrate transporter
    (B) acyl-oxaloacetate/oxaloacetate transporter
    (C) acyl-malate/malate transporter
    (D) acyl-carnitine/carnitine transporter

16. Which of the following amino acids play critical roles in nitrogen metabolism, and are present at higher concentrations than other amino acids in most tissues?
    (A) aspartate and asparagine
    (B) lysine and arginine
    (C) glutamate and glutamine
    (D) alanine and methionine

17. Which of the following complexes in the mitochondrial electron transport chain is also an enzyme that is directly involved in citric acid cycle?
    (A) Complex I
    (B) Complex II
    (C) Complex III
    (D) Complex IV

18. The tertiary structure of a globular protein is determined by its amino acid sequence. Certain globular proteins are not denatured by _____ and can regain their native structure and biological activity.
    (A) heat
    (B) extremes of pH
    (C) denaturing reagents
    (D) frozen

19. Pyruvate formed by glycolysis from glucose can be further catabolized into following products **except** _____.
    (A) ethanol
    (B) lactate
    (C) acetyl-CoA
    (D) glyceraldehyde 3-phosphate

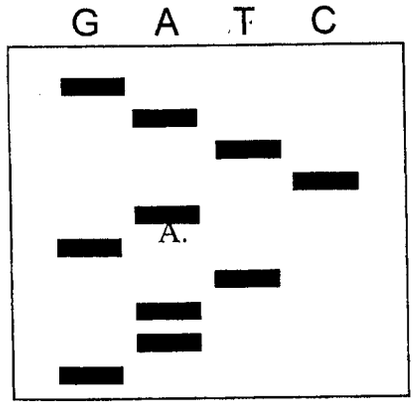
（背面仍有題目，請繼續作答）

20. Breakdown of glycogen requires following enzymes **except** _____.
    (A) glycogen phosphorylase
    (B) glucantransferase
    (C) debranching enzyme
    (D) glycogen phosphatase

21. Calculate the pH of a mixture of 0.1M acetic acid and 0.01 M sodium acetate. The *pKa* of acetic acid is 4.76.
    (A) 3.76
    (B) 4.76
    (C) 5.76
    (D) 4.96

22. MHC (major histocompatibility complex) is an important protein for the antigen recognition in the hosts. Which of the following cells do not have MHC class II protein on their cell surface?
    (A) fibroblasts
    (B) macrophages
    (C) B lymphocytes (B cells)
    (D) T lymphocytes (T cells)

23. The illustration below is a gel pattern obtained from Maxam-Gilbert sequencing of a DNA. Which is the DNA sequence?



    (A) 5' GATCAGTAAG 3'
    (B) 5' GAATGACTAG 3'
    (C) 5' GGGAAAATTC 3'
    (D) 5' GAATCTAAGG 3'

24. Which of the followings is not a heteropolysaccharide?
    (A) glycogen
    (B) hyaluronan
    (C) chondroitin
    (D) heparin

25. Which of the following components is not a steroid?
    (A) testosterone
    (B) cortisol
    (C) prednisolone
    (D) prostaglandin

SHORT ESSAY 簡答題（Five points for each question. 每題 5 分）

1. How does topoisomerase work to underwind DNA?

2. What is paracrine?

3. What is protein posttranslational modification? And why does the modification of many eukaryotic proteins begin in the endoplasmic reticulum?

4. What is proteasome-mediated degradation system? And why are proteins required to degrade during cell mitosis through this degradation system?

5. Defects in the regulation of gene expression can alter the developmental program of an organism. Do you have any approaches to directly trace the newly synthesized protein in eukaryotic cells?

6. What is the "Q cycle" in the process of respiratory electron transport?

7. If your diet is rich in alanine but deficient in aspartate, will you show signs of aspartate deficiency? Please explain it.

8. The sequence below is the C-terminal region of protein A and which has α helical structure.
   Vel-Gln-Ser-**Vel**-**Phe**-Thr-His-**Vel**-Cys-Ser-His-**Leu**-Asp-Thr-**Leu**-Lys-
   The hydrophobic residues in this sequence are presented in boldface. Suggest a possible reason for the periodicity in their spacing.

（背面仍有題目，請繼續作答）

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9. Simply explain the principles of SDS-electrophoresis and how the method can be employed to estimate protein purity and molecular weight.

10. Draw a diagram and explain how steroid hormones regulate at the transcriptional level.