

考生注意事項：所有考題務必在答案卷上作答，凡在問題卷上作答者無效

一、選擇題(單選，每題二分，答錯倒扣0.5分)

1. The largest energy reserve in human is
 - A. blood glucose.
 - B. liver glycogen.
 - C. muscle glycogen.
 - D. adipose tissue triacylglycerol.
 - E. muscle protein.

2. Hepatic glycogenolysis is a primary source of blood glucose during:
 - A. well-fed state.
 - B. early fasting state.
 - C. fasting state.
 - D. early refed state.
 - E. none of the above.

3. Adipose tissue responds to low insulin / glucagon ratio by:
 - A. dephosphorylating the interconvertible enzymes.
 - B. stimulating deposition of fatty acids as fuel during aerobic exercise.
 - C. increasing the amount of pyruvate kinase
 - D. stimulating hormone sensitive lipase
 - E. stimulating phenylamine hydroxylase.

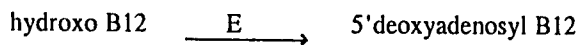
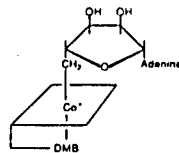
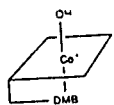
4. Muscle metabolism during exercise:
 - A. is the same in both aerobic and anaerobic exercise.
 - B. shifts from primarily glucose to primarily fatty acid as fuel during aerobic exercise.
 - C. uses largely glycogen and phosphocreatine in the aerobic state.
 - D. causes a sharp rise in blood ketone body concentration.
 - E. uses only phosphocreatine in the anaerobic state.

5. Which of the following compounds has less effect on the rate of urea biosynthesis in rat liver slice culture?
 - A. Arginine
 - B. Putrescine
 - C. Ornithine
 - D. Argininosuccinate
 - E. Citrulline

6. Which of the following compounds is one of the possible sources of one carbon unit of folic acid?
 - A. Methionine
 - B. Valine
 - C. Leucine
 - D. Phenylalanine
 - E. Histidine

7. What is the major form of degradation product of heme in the bile?
- Biliverdin
 - Bilirubin
 - Bilirubin diglucuronide
 - Protoporphyrin
 - Uroporphyrinogen
8. Which of the following statements of cystathione is incorrect?
- It is the condensation product of homocysteine and serine.
 - It is an intermediate in the biosynthesis of cysteine in animals.
 - Its synthesis requires pyridoxal phosphate as the coenzyme.
 - Genetic deficiency of cystathione synthetase leads to homocystinuria.
 - Cystathione is cleaved by a lyase to yield H_2S and α -ketobutyrate.
9. Which one of the following compounds is not a metabolite of tyrosine?
- Serotonin.
 - Melanins.
 - Dopamine.
 - Thyroxine.
 - Epinephrine.
10. Which of the following statements about proline metabolism is incorrect?
- Proline is a nonessential amino acid for mammalian.
 - Hydroxyproline can not be incorporated directly into proteins in biosynthesis.
 - Glutamic g-semialdehyde is a precursor of proline biosynthesis.
 - Proline is a pure glucogenic amino acid.
 - In metabolic degradation proline is converted to succinyl- CoA and aspartic acid.
11. If $^{14}CO_2$ containing medium is given to alive rat liver slices, which of the following compounds is less likely to be labeled immediately?
- Arginine
 - Ornithine
 - Citrulline
 - Carbamoyl phosphate
 - Argininosuccinate.
12. What enzyme is used to convert ammonia to nontoxic compound for transporting to liver?
- Arginase
 - Glutaminase
 - Glutamate dehydrogenase

13. Amethopterin (4-amino-10-methylfolate, also known as methotrexate) has been used in treating many different cancers. What is its target enzyme?
- Serine transhydroxymethylase
 - Thymidylate synthetase
 - Dihydrofolate reductase
 - Methionine synthetase
 - Methenyl tetrahydrofolate cyclohydrolase.
14. Genetic deficiency of the enzyme E would result in excessive urinary excretion of what compound?



- Methionine
 - N_5 -methyl tetrahydrofolic acid
 - Methylmalonate
 - Propionate
 - Homocystine
15. Iodoacetate inhibits glycolysis by inactivating
- enolase.
 - phosphoglycerate kinase.
 - glyceraldehyde-3-phosphate dehydrogenase.
 - pyruvate kinase.
 - none of the above.
16. In which carbon atom of pyruvate would be radioactively labeled if glucose metabolized by the glycolytic pathway were labeled with ^{14}C at C1?
- Methyl C
 - Carboxyl C
 - Carbonyl C
 - All C
 - No C

17. Calmodulin is a subunit of
- A. glycogen phosphorylase.
 - B. synthase-phosphorylase kinase.
 - C. glycogen synthase.
 - D. cAMP-dependent protein kinase.
 - E. none of the above.
18. The formation of oxaloacetate during gluconeogenesis is catalyzed by.
- A. Malic enzyme.
 - B. Pyruvate kinase.
 - C. Pyruvate dehydrogenase.
 - D. Pyruvate carboxylase.
 - E. None of the above.
19. Which of the following coenzymes is directly involved in the decarboxylation step of pyruvate dehydrogenase
- A. Flavin adenine dinucleotide
 - B. Nicotinamide adenine dinucleotide
 - C. Thiamine pyrophosphate
 - D. Lipoamide
 - E. Coenzyme A
20. The formation of 1 mole of glucose from 2 moles of lactate requires
- A. 4 moles of ATP, 2 moles of GTP, and 2 moles of NADH.
 - B. 4 moles of ATP and 2 moles of GTP.
 - C. 6 moles of ATP and 2 moles of GTP.
 - D. 4 moles of GTP and 2 moles of ATP.
 - E. none of the above.

二、選擇題 (以下列方式選答,每題二分,答錯倒扣0.5分)

- (A) if 1, 2, and 3 are correct
- (B) if 1 and 3 are correct
- (C) if 2 and 4 are correct
- (D) if only 4 is correct
- (E) if all four are correct

21. The regeneration of NAD^+ during aerobic glycolysis requires
1. mitochondrial electron transport chain.
 2. glyceraldehyde-3-phosphate dehydrogenase.
 3. molecular oxygen.
 4. lactate dehydrogenase.
22. Phosphofructokinase
1. is inhibited by ATP.
 2. is activated by fructose-2,6-bisphosphate.
 3. is a rate-limiting enzyme of glycolysis.
 4. catalyzes a substrate-level phosphorylation.
23. The rate of glycogen degradation in a liver cell is enhanced by
1. inhibiting adenyl cyclase.
 2. phosphorylation of phosphorylase kinase.
 3. decreasing the Ca^{++} concentration.
 4. increasing the epinephrine concentration.
24. Glycogen synthase D is activated by
1. glucose-6-phosphate.
 2. AMP.
 3. the action of phosphoprotein phosphatase.
 4. cAMP.
25. The rate of gluconeogenesis in a liver cell is enhanced by
1. decreasing the concentration of acetyl CoA.
 2. decreasing the concentration of fructose-2,6-bisphosphate.
 3. increasing the concentration of AMP.
 4. phosphorylation of PFK-2.
26. The citric acid cycle is inhibited by the increasing concentration of which of the following compounds?
1. ATP
 2. ADP
 3. NADH
 4. NAD^+

27. Succinate dehydrogenase

1. catalyzes the oxidation of succinate to malate
2. catalyzes the formation of succinyl CoA.
3. is a rate-limiting enzyme of citric acid cycle.
4. contains covalently bound FAD.

三、簡答題

28. Metabolism of phospholipid on the cell membrane is one of the major pathways of signal transduction in eucaryotic cells.

- A. Explain the relationship between generation of Ca^{+2} and degradation of certain forms of phospholipids. (3%)
- B. Explain how metabolism of phospholipid activates protein kinase C. (3%)

29. Briefly explain the structure and biological function of oligomeric G protein. (4%)

30. Describe briefly the biosynthesis of thymine nucleotides? (3%)

31. Describe briefly pyrimidine salvage pathway. (3%)

32. Describe gene transfer and selection protocols which may be used to clone the human APRTase gene. (5%)

33. Describe the most important pathway regulating cholesterol homeostasis (5%)

34. Describe the properties of receptor (5%)

四、解釋下列名詞

35. HAT medium (2%)

36. Lesch-Nyhen syndrome (2%)

37. Explain the difference between the following pairs of term (8%)

- a. Down regulation vs desensitization
- b. Specific binding vs monospecific binding
- c. Endocrine vs paracrine
- d. Hormone vs vitamin

五 配對題 (把下列Coenzyme與它適當的構造配對, 每題一分)

38. Niacin

39. Biotin

40. Pyridoxal

41. Vitamin C

42. Pantothenic acid

