

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 (均為單選, 每題 1 分, 答錯倒扣 0.25 分)

1. What is the main catabolic product of purine in human?
 - A. urea
 - B. alanine
 - C. uric acid
 - D. allantoin
 - E. none of the above
2. The Lesch-Nyhan syndrome is an inherited X-linked recessive disorder characterized by cerebral palsy, self mutilation and overexcretion of the purine.
The defect is due to the deficiency of
 - A. hypoxanthine-guanine phosphoribosyl transferase.
 - B. ribose phosphate synthetase.
 - C. purine nucleoside phosphorylase.
 - D. xanthine oxidase.
 - E. hypoxanthine oxidase.
3. Pyrimidine catabolism
 - A. produces uric acid.
 - B. is excessive in gout.
 - C. requires xanthine oxidase.
 - D. yields ammonia and carbon dioxide that can be converted to urea.
 - E. none of the above.
4. The major site of acetoacetate formation from fatty acids is in the
 - A. liver.
 - B. adipose tissue.
 - C. intestinal mucosa.
 - D. kidney.
 - E. muscle.
5. Among the differences between fatty acid synthesis and fatty acid oxidation is the fact that
 - A. synthesis proceeds in the mitochondria and oxidation in the cytosol.
 - B. synthesis uses NADH and oxidation, FAD.
 - C. synthesis is accelerated and oxidation depressed in diabetics.
 - D. malonyl CoA is an intermediate in oxidation but not in synthesis.
 - E. the acyl groups form different thioesters in synthesis and oxidation.
6. The products from β -oxidation of a fatty acid with an odd carbon number are
 - A. acetyl CoA and succinyl CoA.
 - B. propionyl CoA and malonyl CoA.
 - C. succinyl CoA and propionyl CoA.
 - D. malonyl CoA and acetyl CoA.
 - E. acetyl CoA and propionyl CoA.
7. Most of the cholesterol used for cellular activity comes from
 - A. de novo synthesis.
 - B. hydrolysis of cholesterol ester.
 - C. LDL-cholesterol.
 - D. HDL-cholesterol.
 - E. VLDL-cholesterol.
8. Which reaction in LDL pathway is temperature dependent?
 - A. LDL binding.
 - B. Internalization.
 - C. Hydrolysis.
 - D. Regulation.
 - E. Receptor production.

9. Arachidonic acid is released from membrane phospholipids by the action of
- A. lipoprotein lipase.
 - B. hormones sensitive lipase.
 - C. phospholipase D.
 - D. phospholipase A₂ or C.
 - E. monoglyceride kinase.
10. Prostacyclin is mainly produced in
- A. fibroblasts.
 - B. kidney.
 - C. vesicular endothelium.
 - D. platelets.
 - E. vesicular gland.
11. How many moles of ATP will be generated during the complete oxidation of 1 mole of palmityl CoA.
- A. 125
 - B. 127
 - C. 129
 - D. 131
 - E. 133

二. 選擇題 (均為單選, 每題二分, 答錯倒扣 0.5分)

12. Which of the following amino acids is both ketogenic and glucogenic?
- A. Leucine
 - B. Valine
 - C. Isolucine
 - D. Alanine
 - E. Serine
13. In the catabolism of phenylalanine
- A. an intermediate with a formimino group is produced.
 - B. the benzene ring is excreted as hippuric acid.
 - C. the catabolism involves a reaction in which there is a hydroxylation, oxidative decarboxylation and the shift of a carbon chain.
 - D. kynurenine as an intermediate in catabolism.
 - E. the initial reaction in its catabolism is deamination.
14. Allopurinol
- A. is an inhibitor of xanthine oxidase and used to treat chronic gout.
 - B. is an antifolates and used for antibacterial agent.
 - C. inhibits the salvage pathway of purine.
 - D. inhibits the salvage pathway of pyrimidine.
 - E. is synthesized de novo using dPRPP.
15. Deoxyribonucleotides
- A. are synthesized from ribonucleotides by an enzyme system involving thioredoxin.
 - B. are synthesized from ribonucleotides by nucleotide kinases.
 - C. can be form only by salvaging free bases.
 - D. cannot be synthesized so they must be supplied preformed in the diet.
 - E. are synthesized de novo using phosphoribosyl pyrophosphate.
16. The complete oxidation of 1 mole 1,3-bisphosphoglycerate to CO₂ and H₂O in man would yield
- A. 4 moles of ATP.
 - B. 17 moles of ATP.
 - C. 19 moles of ATP.
 - D. 22 moles of ATP.
 - E. 38 moles of ATP.

17. Regarding to the regulation of glycogen phosphorylase, which of the following statements is INCORRECT?
- A. Ca^{++} is an activator of both phosphorylase kinase a and b.
 - B. Calmodulin is a subunit of phosphorylase kinase.
 - C. cAMP-dependent protein kinase activates phosphatase inhibitor-1.
 - D. Phosphorylase b is activated by the action of phosphoprotein phosphatase.
 - E. Phosphorylase a can function as a glucose receptor in the liver.
18. The pentose phosphate pathway
- A. is a major producer of ATP.
 - B. allows for the metabolism of pentoses by introducing them into the glycolytic pathway.
 - C. is the major source of NADH formation in the cytosol.
 - D. requires ATP in addition to the initial phosphorylation of glucose by hexokinase.
 - E. none of the above

三. 問答題

19. (3%) Methotrexate is clinically useful in treating some forms of cancer, how can this drug inhibit growth of cancer cell?
20. (5%) Indicate the major biosynthetic reactions that utilize 5-phosphoribosyl-1-pyrophosphate (PRPP).
21. (5%) Describe the difference between the cori cycle and the alanine cycle in gluconeogenesis.
22. (8%) Describe the effects and molecular mechanisms of glucagon in glycolysis and glycogen metabolism in liver cells.
23. (6%) Outline the pathway for galactose metabolism in man. What is galactosemia? How is it treated?
24. (6%) Indicate the initial labeling that will be formed in α -ketoglutarate when ($\text{U-}^{14}\text{C}$)-acetyl CoA ($^*\text{CH}_3\text{-}\overset{\text{O}}{\parallel}{\text{C}}\text{-S-CoA}$) is metabolized via the tricarboxylic acid cycle.
25. (6%) List three factors which regulate the free cholesterol content in the cells.
26. (6%) Explain why a diabetic patient with inadequate glucose intake would be nutritionally better off eating fats with fatty acids of odd-numbered chain length rather than even-numbered chain length.
27. (10%) In mammals, excess ammonia is excreted after conversion to urea in a pathway called the urea cycle, which utilizes mitochondrial as well as cytoplasmic enzymes. Name the mitochondrial enzymes and describe the enzyme catalyzed reactions with chemical equations.
28. (10%) A large number of biological compounds contain methyl groups that is added to the parent compound from the activated methionine. Write a sequence of known enzyme reactions that results in the transfer of methyl group from methionine to a methyl receptor.
29. (10%) If palmitate, labeled on every odd-numbered carbon, is completely oxidized through β -oxidation and TCA cycle, what carbon on malate will be labeled? Explain.