(Single choice, 2.5% each)

1. If a protein contains 120 amino acid residues, the contour length of its corresponding coding region with a B form DNA is about
   (A) 12 nm (B) 24 nm (C) 120 nm (D) 240 nm

2. If the content of G plus C is 42% in a double strand DNA, the content of A is
   (A) 10.5% (B) 21% (C) 25% (D) 29%

3. If the sequence of a segment of mRNA is 5'-GCAUUCUUAAAA-3', the DNA sequence complementary to it is
   (A) 5'-GCATTCTTAAAA-3' (B) 5'-CGTAAGAATTTT-3'
   (C) 5'-AAAATTCTTACG-3' (D) 5'-TTTTAAGAATGC-3'

4. From the followings, select the one that belongs to Archaebacteria .
   (A) Cyanobacteria (B) Thermotoga (C) Methanogens (D) Microsporidia

5. Which enzyme can digest DNA into small oligonucleotides?
   (A) phosphodiesterase (B) phospholipase A2 (C) phospholipase C
   (D) phospholipase D (E) phosphatase

6. Which of the event is important for epidermal growth factor signaling?
   (A) ADP-ribosylation (B) Farnesylation (C) Mono-oxygenation
   (D) Peroxidation (E) Glycosylation

7. Leukotriene is converted from arachidonate by which of the following enzyme?
   (A) HMG-CoA reductase (B) Cyclooxygenase (C) Phospholipase
   (D) Lipoxygenase (E) Lipid Kinase

8. Glucose enters the cells via:
   (A) free diffusion (B) a channel (C) a symporter
   (D) endocytosis (E) pinocytosis

9. The tricarboxylic acid cycle is amphibolic, since it takes part in some metabolic pathways. However, which of the following pathway **is not** included? (A) fatty acid synthesis (B) glycogenolysis (C) gluconeogenesis (D) deamination

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10. Which vitamin is the precursor of coenzyme CoA that used in the TCA cycle.
(A) pantothenic acid (B) thiamin (C) niacin (D) riboflavin

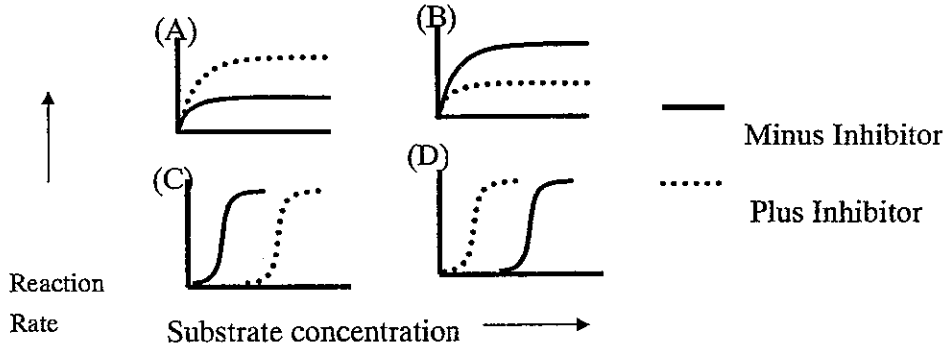
11. Which of the following description is correct. (A) 2, 3-BPG decreases the affinity of hemoglobin for oxygen in red blood cells. (B) Pyruvate is oxidized to acetyl-CoA by an enzyme known as pyruvate kinase. (C) Number of ATP formed per mole of glucose under aerobic conditions in red blood cells is 38. (D) The Ribose is the "sugar" of the body.

12. For gluconeogenesis, which of the following description **is not** correct. (A) Glucogenic amino acids are substrate for gluconeogenesis. (B) Blood glucose can be derived from gluconeogenesis. (C) Fructose 2, 6-Bisphosphate plays a unique role in the regulation of glycolysis and gluconeogenesis in liver. (D) Gluconeogenesis has a nonoxidative phase, which provides ribose precursors for nucleotide synthesis.

13. What prevents linear eukaryotic DNA from becoming increasing shorter after each round of DNA replication?
(A). DNA polymerase I (B). Telomeres (C). DNA ligase (D). DNA helicase

14. The structure of RNA molecules in mammalian cells:
(A). depends primarily on specific base pairing within the molecule
(B). is determined by post-translational modifications such as phosphorylation
(C). is invariably disordered and entirely random
(D). is the same as the proteins they encode

15. Which of the following graphs shows the results of reaction rate vs substrate concentration for an allosteric enzyme in the absence and presence of an allosteric inhibitor?



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16. One strand of a DNA molecule has the following sequence:
3'--- A G T A C A A A C T A T C C A C C G T C ---5'
If this strand were transcribed, the resulting molecule would have the sequence:
(A). 3'- A G T A C A A A C T A T C C A C C G T C ---5'
(B). 5'- A G U A C A A A C U A U C C A C C G U C ---3'
(C). 3'- U C A U G U U U G A U A G G U G G C A G ---5'
(D). 5'- U C A U G U U U G A U A G G U G G C A G ---3'

17. Which of the following polymerase is the major polymerase involved in the mitochondria DNA replication? (A) Pol1 α (B) Pol β (C) Pol κ (D) Pol γ (E) none of the above.

18. Which of the following protein can bind single strand DNA? (A)Topisomerase (B) Helicase (C) Rec A (D) Nde 1 (E) DNA ligase

19. Which of the following proteins can not recognize DNA-RNA hybrids? (A) DNA polermerase α (B) polymerase δ (C) RNase H (D) RNA polymerase (E) none of the above

20. Which of the following molecules are not involved in the negative feed-back regulation of producing 5-phosphoribosyl 1-amine during purine synthesis.
(A) XMP (B) GDP (C) ADP (D) ATP (E) none of the above

21. Reaction coordinate diagram comparing enzyme-catalyzed and uncatalyzed reactions shows that catalysts enhance reaction rates by
(A) lowering activation energy. (B) increasing activation energy.
(C) lowering free energy. (D) increasing free energy.

22. V_o = a fraction of V_{max} at [S] = $3K_m$ is
(A) $V_o = V_{max}$. (B) $V_o = 1/2V_{max}$. (C) $V_o = 2/3V_{max}$. (D) $V_o = 3/4V_{max}$.

23. Regulation is most effective when the affected enzyme catalyzes a
(A) rate-limiting step (B) acid catalyzed step (C) base catalyzed step
(D) metal catalyzed step

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24. RNA hydrolysis catalyzed by pancreatic ribonuclease is mediated by the formation of
(A) 1',2'-cyclic nucleotides　(B) 2',3'-cyclic nucleotides
(C) 3',4'-cyclic nucleotides　(D) 4',5'-cyclic nucleotides

25. Which one of the following organelles possibly generates reactive oxygen species:
(A) lysosome (B) nucleolus (C) mitochondria (D) nucleus

26. Which one of the following amino-acid residue has been found covalently linked to the glycan moiety of a glycoprotein molecule: (A) Ala (B) His (C) Gly (D) Thr.

27. Which one of the following amino-acid residue in a protein molecule cannot be modified by a protein kinase: (A) Tyr (B) Arg (C) Ser (D) Thr

28. Which one of the following is not the phenotype of cancer cells:
(A) transformation (B) aneuploid (C) uncontrolled cell growth
(D) senescence

29. LDL contains which of the following apolipoprotein?
(A) apo A-I (B) apo B-100 (C) apo B-48 (D) apo E

30. Which of the following statements is **true** ?

(A) A principle action of insulin on adipose tissue is to stimulate secretion of fatty acids.

(B)Fatty acid synthase has a requirement for biotin as coenzyme.

(C)Fatty acid C20:4$\triangle^{5,8,11,14,}$ can be converted to C20:5$\triangle^{5,8,11,14,17}$ in the liver.

(D) Chylomicron remnants can be uptaken by the liver through LDL-receptor or LRP mediated endocytosis.

31. How many moles of ATP can be produced when a mole of oleoyl-CoA is completely oxidized in the mitochondria?
(A) 129 (B) 131 (C) 146 (D) 148

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32. Which of the following is not an inhibitor of HMG-CoA reductase?
(A) cholesterol (B) mevalonate (C) 3-hydroxy-3-methylglutaryl-CoA
(D) bile acids

33. A peptide has the sequence Glu-His-Trp-Ser-Gly-Leu-Arg-Pro-Gly, what is the pI for this peptide ? (A) 3.0 (B) 5.0 (C) 8.0 (D) 11.0

34. Which of the following reagents is a oxidizing reagent ?
(A) Performic acid (B) Mercaptoethanol (C) Urea (D) Ninhydrin

35. β–sheets are stabilized by which of the force?
(A)hydrophobic interaction (B) Van der Waals force (C) hydrogen bonds are formed between adjacent segments of polypeptide chain (D) hydrogen bonding between the R groups

36. Which one of the following amino acids would be considered most hydrophobic?
(A) Serine (B)Tyrosine (C) Glutamate (D) Methionine

37. Which amino acid is actively involved in the biosynthesis of selenocysteine?
(A) Ala (B) Ser (C) Gly (D) Trp

38. Which amino acid is actively involved in biosynthesis of glutathione?
(A) Tyr (B) Phe (C) Cys (D) Arg

39. Which enzyme is involved in the decomposition of hydrogen peroxide?
(A) Trypsin (B) Chymotrypsin (C) Esterase (D) Catalase

40. Which protein contains Fe element?
(A) Hemoglobin (B) trypsin (C) pepsin (D) Amylase

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