

每小題 2 分，請用 2B 鉛筆作答於答案卡，並先詳閱答案卡上之「畫記說明」。

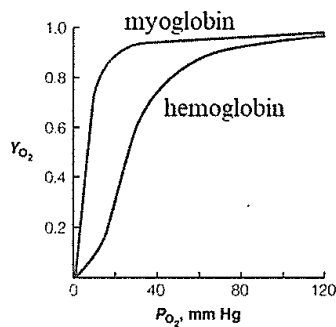
- Which one of the following reactions is catalyzed by a “transferase”?
 - glucose-6-phosphate \rightarrow fructose-6-phosphate
 - glyceraldehyde 3-phosphate + NAD⁺ \rightarrow bisphosphoglycerate + NADH
 - fructose-1,6-bisphosphate \rightarrow dihydroxyacetone phosphate + glyceraldehyde 3-phosphate
 - fructose-6-phosphate + ATP \rightarrow fructose-1,6-bisphosphate + ADP
 - dihydroxyacetone phosphate \rightarrow glyceraldehyde 3-phosphate
- Which one of the following features regarding “competitive inhibitor” is NOT true?
 - does not change V_{max}
 - increase in K_M
 - binding to the ES complex
 - binding to the active site of an enzyme
 - decrease in V_{max} / K_M
- The following method is NOT developed for the analysis of mRNA level:
 - Northern blot analysis
 - Sanger’s method for cDNA sequencing
 - Reverse transcriptase-polymerase chain reaction
 - cDNA microarray
 - Next generation sequencing
- The following characteristics is NOT belonged to the transcriptional regulation of enhancers in eukaryotes:
 - Work when located long distance from the promoter
 - Work when upstream or downstream from the promoter
 - Work when oriented in either direction
 - Work through heterologous promoters
 - Work by binding only one specific transcription factor
- The following condition is NOT suitable for phage lamda to undergo lytic pathway:
 - Expression of lambda repressor
 - Expression of cro antiterminator
 - Expression of RecA protein
 - Lysogenic pathway is terminated under UV radiation
 - cro protein binds to the promoter OR3 site
- The following statement is NOT true for the regulation of lactose operon:
 - 1,6-allolactose is a true inducer
 - cI repressor functions as tetramer
 - cI repressor is a diffusible repressor
 - lactose operon is an inducible anabolic operon
 - Under low glucose condition, CAP when bound with cAMP can bind to the upstream lacZ promoter and increase transcription efficiency

見背面

7. In the sequence of cytochrome *c*, the presence of cysteine at position 17 in hundreds of different species indicates that this particular amino acid is:
- A) Conserved
 - B) Mutated
 - C) Homologous
 - D) Variable
 - E) none of the above

8. Of the following proteins that aid in the folding process, which is exclusively involved in the interconversion of *cis* and *trans* bonds?
- A) prolyl isomerase
 - B) protein disulfide isomerase
 - C) Hsp60
 - D) Hsp70
 - E) GroEL-ES complex

9. Based on the plot of oxygen saturation versus partial pressure of oxygen, which of the following statements is true?

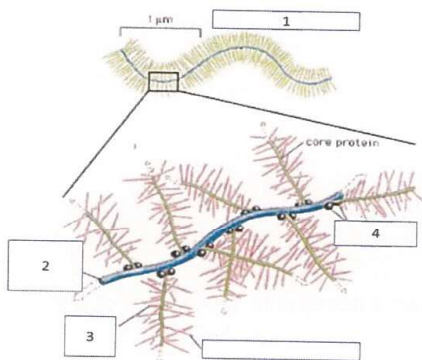


- A) at oxygen pressure >100 mm Hg, hemoglobin dissociates into individual subunits so that it is able to bind oxygen similar to myoglobin
 - B) at typical resting capillary oxygen pressure of ~30 mm Hg, hemoglobin has only 1 of its 4 oxygen binding sites filled while myoglobin is nearly saturated with oxygen
 - C) under periods of extreme muscle exertion, capillary oxygen pressure can drop to 10 mm Hg, allowing release of ~90% of oxygen carried by hemoglobin
 - D) the structure of hemoglobin allows for complete release of oxygen in capillary beds at all times
 - E) none of the above
10. Why do individuals who are heterozygous for sickle cell anemia have a resistance to malaria?
- A) formation of hemoglobin aggregates makes red blood cells impervious to parasitic infection
 - B) shortened life span of red blood cells does not allow sufficient time for the parasite to mature in the red blood cell
 - C) diminished blood flow to the skin as a result of sickled red blood cells blocking capillaries prevents mosquitoes from actually transferring the malaria parasite to individuals
 - D) sickle cell hemoglobin fibers have both decreased O₂ and CO₂ carrying capacity; since CO₂ is a mosquito attractant, diminished CO₂ exhalation does not attract mosquitoes
 - E) none of the above

11. The SMC proteins (for structural maintenance of chromosomes) include cohesins and condensins, and are known to have all of the following properties EXCEPT:
- A) a complete ATP binding site
 - B) a hinge region
 - C) topoisomerase activity to produce positive supercoils
 - D) the ability to condense DNA
 - E) two coiled-coil domain.
12. Which of these enzymes is NOT directly involved in methyl-directed mismatch repair in *E. coli*?
- A) DNA glycosylase
 - B) DNA helicase II
 - C) DNA ligase
 - D) DNA polymerase III
 - E) Exonuclease I
13. The repair of cyclobutane pyrimidine dimers by bacterial DNA photolyase involves the cofactor:
- A) coenzyme A
 - B) FADH₂
 - C) coenzyme Q
 - D) pyridoxal phosphate (PLP)
 - E) thiamine pyrophosphate (TPP)
14. In homologous recombination in *E. coli*, the protein that moves along a double-stranded DNA, unwinding the strands ahead of it and degrading them, is:
- A) *chi*
 - B) DNA ligase
 - C) RecA protein
 - D) RecBCD enzyme
 - E) RuvC protein (resolvase)
15. Which of the following produced more energy (ATP) when oxidized through β -oxidation?
- A) linoleic acid
 - B) α -linolenic acid
 - C) oleic acid
 - D) stearic acid
 - E) palmitic acid
16. Which of the following enzymes can be inhibited by mevalonate?
- A) acyl-CoA synthetase
 - B) cholesterol 7 α -hydroxylase
 - C) cyclooxygenase
 - D) lipoxygenase
 - E) HMG-CoA reductase

17. Lecithin-cholesterol acyl-transferase is involved in the formation of :
- A) Chylomicron
 - B) VLDL
 - C) IDL
 - D) LDL
 - E) HDL₃
18. Which of the following has highest melting point?
- A) stearic acid
 - B) oleic acid
 - C) linoleic acid
 - D) γ -linolenic acid
 - E) α -linolenic acid
19. What following enzyme can generate a product of H₂O?
- A) prolyl hydroxylase
 - B) aromatic L-amino acid decarboxylase
 - C) phenylalanine hydroxylase
 - D) glucose 6-phosphate dehydrogenase
 - E) 6-phosphogluconate dehydrogenase
20. What following enzyme can use a phosphate as a reactant to carry on the reaction?
- A) pyrophosphatase
 - B) UDP-glucose pyrophosphorylase
 - C) debranching enzyme
 - D) phosphorylase
 - E) pyruvate kinase
21. What following metabolite can be found in TCA, gluconeogenesis from pyruvate, and amino acid biosynthesis in human body?
- A) phosphoenolpyruvate
 - B) oxaloacetate
 - C) α -ketoglutarate
 - D) citrate
 - E) 3-phosphoglycerate
22. What enzyme is used to produce a functional heme?
- A) ferrochelatase
 - B) heme oxygenase-1
 - C) heme oxidase
 - D) protoporphyrinogen oxidase
 - E) heme reductase

23. The mechanism that separates proteins on an SDS-PAGE gel is:
- A) negative charge on protein
 - B) protein shape
 - C) protein density
 - D) protein molecular weight
 - E) resistant to protein mobility
24. Which is the amino acid that delivers nitrogen wastes from muscle to the liver for catabolism?
- A) glutamate
 - B) glutamine
 - C) alanine
 - D) aspartate
 - E) asparagine
25. Which of the phospholipid is it that often serves as an eat-me signal in apoptotic cells?
- A) phosphatidyl choline
 - B) phosphatidyl ethanolamine
 - C) phosphatidyl serine
 - D) phosphatidic acid
 - E) phosphotidyl inositol
26. Which of the following is NOT a branched amino acid?
- A) 2-aminoisobutyric acid
 - B) leucine
 - C) isoleucine
 - D) proline
 - E) valine



For questions 27~30:

The above complex existing in the cartilage, please fill the blank in number 1~4:

27. The name of this complex indicates by number 1 in the blank square should be:

- A) Glycosaminoglycan
- B) Perlecan
- C) Proteoglycan
- D) Syndecan-1
- E) Integrin

見背面

28. The blue strip in the complex marked in number 2 should be:
- A) Chondroitin sulfate
 - B) Heparin
 - C) Heparan sulfate
 - D) Hyaluronic acid
 - E) Keratan sulfate
29. The red line in the complex marked in number 3 should be:
- A) Chondroitin Sulfate
 - B) Heparan sulfate
 - C) Heparin
 - D) Hyaluronic acid
 - E) None of above
30. The black dot in the complex marked in number 4 should be:
- A) Aggrecan
 - B) Link protein
 - C) CD44
 - D) Spike protein
 - E) integrin
31. The process by which ATP is formed directly in glycolysis is:
- A) ATP hydrolysis
 - B) oxidative phosphorylation
 - C) isomerization
 - D) substrate-level phosphorylation
 - E) none of the above
32. Amylose is different from amylopectin because:
- A) it is composed of glucose residues
 - B) it has more glucose residues
 - C) it is highly branched
 - D) it is unbranched
 - E) it contains no three-dimensional structure
33. In most tissues, an increase in the following ratio directly causes a decrease in TCA cycle activity:
- A) FAD/FADH₂
 - B) ADP/ATP
 - C) GDP/GTP
 - D) NADH/NAD⁺
 - E) none of the above

題號： 180

國立臺灣大學 110 學年度碩士班招生考試試題

科目： 生物化學(一般生物化學)

題號：180

節次： 1

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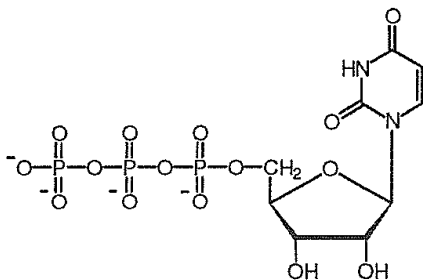
34. The regulation of the glycolytic pathway involves:
- A) feedback inhibition by ATP
 - B) allosteric inhibition by ATP
 - C) allosteric stimulation by ADP
 - D) all three are correct
 - E) none of the above
35. For translation initiation, eukaryotes do NOT require:
- A) 7-methyl GTP cap at 5' end of mRNA
 - B) Start codon
 - C) eIF-2-GTP
 - D) poly(A) tail at 3' end of mRNA
 - E) Shine-Dalgarno sequence
36. In translation elongation, which molecule binds incoming aminoacyl-tRNA for loading it to A site:
- A) EF-Tu
 - B) EF-Ts
 - C) EF-G
 - D) myosin
 - E) importin
37. A silent mutation at the protein-coding region of genome will cause:
- A) protein degradation
 - B) early termination of protein synthesis
 - C) amino acid change
 - D) protein targeting error
 - E) none of above
38. Which molecule is NOT required for peptide bond formation at ribosome?
- A) rRNA
 - B) aminoacyl-tRNA
 - C) ribosomal large subunit
 - D) ATP
 - E) all of above are required
39. G protein is active when:
- A) GDP replaces GTP
 - B) It is bound by its ligand and transported to the nucleus
 - C) GTP is bound to it
 - D) It is phosphorylated by protein kinase
 - E) Ca²⁺ binds to a protein-linked receptor

見背面

40. The cholera toxin does not allow GTP to be hydrolyzed to GDP. What effects of cholera toxin would you expect to see in the cell?
- A) The inactivation of ligand-gated ion channels
 - B) The inactivation of G-protein linked signaling pathways
 - C) The activated G proteins would remain locked in the "on" position, transmitting signal even in the absence of signaling molecule
 - D) All of the cAMP would be used up
 - E) All of above
41. During the transduction of a signal, one molecule or ion may be closely associated or interact with the activity of another. Select the pair that is INCORRECTLY combined.
- A) Calcium—IP₃
 - B) cAMP—adenylyl cyclase
 - C) cAMP—protein kinase A (PKA)
 - D) PIP₃—DAG
 - E) cGMP—Guanylyl cyclase
42. All Androgens are formed from:
- A) Proteins
 - B) Tyrosine
 - C) Cholesterol
 - D) Small peptides
 - E) Fatty acid
43. Which RNA describes below is NOT non-protein coding RNA?
- A) mRNA
 - B) lncRNA
 - C) tRNA
 - D) siRNA
 - E) rRNA
44. Which description of the difference between DNA and RNA synthesis is WRONG?
- A) Both of them have active and efficient proofreading function
 - B) Ribonucleotides are used in RNA synthesis
 - C) RNA polymerase does not need primer to initiate the synthesis of RNA
 - D) U replaces T as the complementary base for A in RNA
 - E) Only portions of the genome are transcribed into RNA, whereas the entire genome must be copied, once and only once during DNA replication
45. Which modification describes below is NOT eukaryotic RNA processing?
- A) 5' capping
 - B) Splicing
 - C) 3' polyadenylation
 - D) Phosphorylation
 - E) Intron removal

46. Which transcriptional step is NOT regulated by CTD (carboxy terminal domain) phosphorylation/dephosphorylation of RNA polymerase II?
- A) Promoter clearance
 - B) Promoter elongation
 - C) Promoter termination
 - D) mRNA process
 - E) Promoter initiation

47. Which one of the following descriptions as to chromatin is WRONG?
- A) Transcriptionally inactive chromatin is densely packed during interphase
 - B) Transcriptionally active chromatin stains less densely and is referred to as heterochromatin
 - C) Constitutive heterochromatin is found in the regions near the chromosomal centromere and at chromosomal ends
 - D) Facultative heterochromatin is at times condensed, but at other times it is actively transcribed
 - E) None of them



48. The structure above is:
- A) UTP
 - B) dATP
 - C) GTP
 - D) dCTP
 - E) All are wrong
49. Which one of the following subunits is NOT contained in the basic DNA-dependent RNA polymerase of the bacterium *Escherichia coli*?
- A) α subunit
 - B) β subunit
 - C) ω subunit
 - D) σ subunit
 - E) None of them
50. Which one of the following statements as to TATA box is RIGHT?
- A) A six-nucleotide-pair A+T-rich sequence about 35 nucleotides upstream of the transcription start site in bacterial promoters
 - B) It is usually located 10–15 bp upstream from the transcription start site in mammalian genes
 - C) The human TATA box is bound by the 34 kDa TATA-binding protein, a subunit in TFIID
 - D) All eukaryotic mRNA-encoding genes possess a consensus TATA box
 - E) All are right