BIOCHEM TEST BANK

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#لجان-الدفعات

1. The right arrangement of hemoglobin chains synthesis in human:

A. it starts is liver then yolk sac and finally in bone marrow.

B. it starts in yolk sac then liver and finally in bone marrow.

C. yolk sac and liver synthesize hemoglobin for almost the same period in gestation liver and yolk sac then bone marrow after birth.

2. The R form of hemoglobin is stabilized by:

A. Electrostatic interaction between Asp of beta chain with His within the same chain.

B. Electrostatic interaction between carboxylate of His146 with Lys of alpha chain.

C. Electrostatic interaction between His146 of beta chain with Asp of the alpha chain.

D. Hydrogen bond between Asn of beta chain with Asp within the same chain.

E. Hydrogen bond between Asn of beta chain with Asp of alpha chain

3. Prediabetes is characterized by having these lab results of glucose:

A. 155 mg/dL or 7%

B. 212 mg/dL or 11.8 mmol/L.

C. 120 mg/dL or 40mmol/mol.

D. 9% or11.8 mmol/L.

E. 8% glycosylated glucose or 64 mmol/mol.

4.Which of the following regarding heme structure and abnormalities is CORRECT?

A. Heme consists of a tetrapyrrole ring, with 4 methyl, 2 vinyl and 2 propionate groups.

B. Structural changes in the heme are the most common cause of abnormal hemoglobin.

C. Heme iron if found in an aqueous solution will be present in the ferrous (Fe2+) state

D. The distal histidine of heme is involved in the binding to ferrous iron

5. 2,3-bisphosphoglycerate binds weakly to fetal hemoglobin than adult hemoglobin because:

a. The heme pocket is less hydrophobic.

b. Fetal hemoglobin has a serine instead of a histidine 143 residue.

c. Fetal hemoglobin has a narrower core.

d. The lysine residue within the core of hemoglobin is replaced by a tyrosine.

e. The N-termini of the alpha chains of fetal hemoglobin are acetylated.

6. A27 years old firefighter is brought to the emergency room after being exposed to smoke during a training exercise. He looks ill and has labored breathing. He is clutching his head and exhibits an altered mental status. On examination, you note that he appears red, and his pulse oximetry reads 100%. You suspect carbon monoxide toxicity. What is true of the oxygen saturation curve during carbon monoxide toxicity?

a. The oxygen saturation curve is shifted to the left.

b. The oxygen saturation curve is shifted to the right.

c. The effect of carbon monoxide on hemoglobin is similar to that of having increased levels of 2,3 bisphosphoglycerate.

d. The effect of carbon monoxide on hemoglobin is similar to that of a low pH state.

e. The effect of carbon monoxide on hemoglobin is similar to that of an increased temperature state

7. Which one of the following statements concerning the binding of oxygen by hemoglobin is correct?

a. The Bohr effect results in a lower oxygen affinity at higher pH values.

b. Carbon dioxide increases the oxygen affinity of hemoglobin by binding to the C terminal groups of the polypeptide chains.

c. The oxygen affinity of hemoglobin increases as the saturation percentage increases.

d. The hemoglobin tetramer binds four molecules of 2,3- bisphosphoglycerate.

e. Oxyhemoglobin and deoxyhemoglobin have the same affinity for protons.

8.This hemoglobin variant is both a quantitative and a qualitative hemoglobinopathy:

a. Hb Hammersmith.

b. Hb Kansas.

c. HbS.

d. HbE.

e. HbC.

9. Mutation of distal histidine into tyrosine results in:

a. Inability to bind to methemoglobin reductase.

b. Inability to release oxygen.

c. Oxidation of iron.

d. Attraction of carbon monoxide.

e. Stabilization of the R form of hemoglobin.

10. Hb Cowtown where His 146 is replaced by Leucine, choose the correct statement:

a. it stabilizes R state and increases affinity for oxygen

b. it stabilizes T state and increases affinity for oxygen

c. it stabilizes R state and decreases affinity for oxygen.

d. it causes degradation of protein.

11. G6PD Mediterranean is characterized by:

a. Reduced stability of the enzyme.

b. Reduced expression, stability, and activity of the enzyme.

c. Reduced activity of the enzyme.

d. Reduced expression of the enzyme.

e. Reduced stability and activity of the enzyme.

12. Fetal pyruvate kinase influence to have hemoglobin with more affinity is by

a. producing more ATP

b. producing more 2,3-BPG

c. producing less 2,3-BPG

13. G6PD deficiency class 2 (Mediterranean) produce an enzyme with :

a. more activity

b. less stability

G. less activity

d. B+C

14. Which of the following is true?

a. most cells, unlike RBCs, have another pathway to synthesize NADPH

b. NADH is required for the activity of cytochrome b5 reductase

c. G6PD deficient Mediterranean variant shows severe enzyme deficiency of young cells

d. all of the above are true

15. Which of the following increases p50 of the curve of O2 binding to Hb:

a. Decreased temperature

b. Increased pH

c. Living in high altitude

d. Mutation at Asn102 of ß-chain

16 • Which of the following is wrong about HbF (Fetal hemoglobin):

a. It can bind 8 oxygen atoms

b. It has similar affinity to myoglobin

c. It is only found in adults

d. It has higher affinity than adult hemoglobin

17. The reason why liver is not affected by deficiency of pyruvate kinase is:

a. ATP and NADH are compensated by other metabolic pathways.

b. The enzyme is not regulated.

c. Reduced activity is compensated by increased expression.

d. Reduced activity is compensated by alternative expression of pyruvate kinase M1.

e. Reduced pyruvate level is compensated by increase uptake of pyruvate.

18. A critical histidine side chain in an enzyme's active site displays a pka value of 8.2,Which of the following best describes the effect of local environment in which this histidine residue resides:

a. A loss of quaternary structure of the hemoglobin molecule.

b. An increase in oxygen binding to hemoglobin.

c. A gain of ionic interactions, stabilizing the "T" form of hemoglobin.

d. An increase in hydrophobic interactions between deoxyhemoglobin molecules.

e. An alteration in hemoglobin secondary structure leading to loss of the "a" helix.

19. Which of the following is correct regarding HbA2:

a. It is found in fetuses in albeit low amounts

b. Percentage of this hemoglobin increases in ß-thalassemia carriers

c. Its blood levels increase if overexpression of LCR (locus control region) occurs

d. It can bind 10 oxygen molecules

20. The concerted and sequential models explain:

a. How binding of Oxygen to one Heme molecule leads to cooperativity

b. Structural changes that occur as Oxygen binding leads to cooperativity

c. The degree of cooperativity as multiple Oxygen molecules bind one Heme molecule

21. Which of the following is wrong about HbF (Fetal hemoglobin):

a. It can bind 8 oxygen atoms

b. It has similar affinity to myoglobin

c. It is only found in adults

d. It has higher affinity than adult hemoglobin

22. Your diabetic patient has a hemoglobin A1c (HbA1c) of 8.8. HbA1c differs from unmodified hemoglobin by which one of the following.

a. Amino acid sequence.

b. Serine acylation.

c. Valine glycosylation.

d. Intracellular location.

e. Rate of degradation.

23. An amino acid substitution in one of chains of hemoglobin could lead to hemoglobinopathy (hemoglobin with abnormal function) for any of the following reasons EXCEEPT:

a. An increase in the 2,3-BPG binding affinity.

b. A change in the affinity of subunits contact.

c. A change in the solubility properties of reduced hemoglobin.

d. An increase in the hydrophilic property of heme-pocket.

e. An increase tendency of the heme iron to exist in the reduced state.

24. A compensatory mechanism to allow adequate oxygen delivery to the tissues at high altitudes, where oxygen concentrations are low, is which one of the following:

a. An increase in 2,3-BPG synthesis by the erythrocyte.

b. A decrease in 2,3-BPG synthesis by the erythrocyte.

c. An increase in hemoglobin synthesis by the erythrocyte.

d. A decrease in hemoglobin synthesis by the erythrocyte.

e. Decreasing the blood pH.

25. Which of the following is wrong about allosteric regulation:

a. low Ph decreases the affinity of hemoglobin towards oxygen.

b. the major effect of CO2 is form of carbamate.

c. 2,3-BPG does its action by increasing electrostatic interactions.

d. Bohr effect works by electrostatic interaction between His with negatively charged amino acid on the same chain.

26. All of the following regarding 2,3 BPG are correct EXCEPT:

a. Decreases the oxygen-binding capacity of hemoglobin.

b. Decreases some of the effects of sickle cell anemia

c. Binds to the pocket situated between the two ß globin chains.

d. Raises the P50 of hemoglobin

e. all the above are correct.

27. • Regarding the binding of 2,3 BPG, it makes a cross-linking by which subunits:

a. B1, A1 subunits.

b. B1, B2 subunits.

c. B1, A2 subunits.

d. A1, A2 subunits.

28. • One of the following statements about Hb-02 relationship is FALSE:

A. When plotted (%) saturation against Po2, the curve will always be the same whatever the Hb concentration is, if other factors remain the same.

B. The (%) saturations of Hb with 02 is dependent on Po2 as well as the Hb concentration.

C. The (%) saturation of Hb with O2 is dependent on Po2 and totally independent of Hb concentration.

D. The quantity of 02 carried in volume of blood is dependent on the Po2 as well as the Hb concentration.

E. If 02 content is plotted against Po2, the level of the curve will be dependent on the Hb concentration of the sample of the blood.

29. A carbamate is formed between CO2 and:

a. Arg141 of the alpha chain.

b. His146 of the beta chain Iron of heme.

c. The N-terminus of the alpha chain.

d. The carboxylate end of the beta group.

30.Which protein is primarily responsible for iron storage in cells

a. Transferrin
b. Ferritin
c. Hepcidin
d. Ferroportin

31. What is the role of the transferrin receptor in iron metabolism?
a.It oxidizes iron for storage
b. It binds iron in the bloodstream for transport
c.It allows for the uptake of iron into cells
d. It stores iron in macrophages

32. In which form is iron stored within ferritin molecules?
a. Ferric (Fe^{3+})
b. Ferrous (Fe^{2+})
c. Elemental iron
d. Heme-bound iron

33.The hormone responsible for regulating iron levels by inhibiting iron absorption and release from macrophages is

A. Erythropoietin
b. Hepcidin
c. Transferrin
d. Ferritin

34.Which factor plays a key role in facilitating the absorption of non-heme iron in the intestines?
a.Vitamin C
b.Vitamin D
c.Vitamin B12
d.Calcium

35. Which of the following proteins is involved in sensing iron levels in the body?
a.Transferrin
b.Hemoglobin
c.HFE
d.DMT1

36. Which one of the following statements regarding the blood coagulation pathways is NOT CORRECT?

A. The components of the extrinsic Xase (tenase) complex are factor VIIa, tissue factor, Ca2+, and factor X.

B. The components of the intrinsic Xase (tenase) complex are factors IXa and VIIIa, Ca2+, and factor X.

C. The components of the prothrombinase complex are factors Xa and Va, Ca2+, and factor II (prothrombin).

D. The extrinsic and intrinsic Xase complexes and prothrombinase complex require anionic procoagulant phosphatidylserine on low- density lipoprotein (LDL) for their assembly.

E. Fibrin formed by cleavage of fibrinogen by thrombin is covalently cross-linked by the action of factor XIIIa, which itself is formed by the action of thrombin on factor XIII.

37. On which one of the following coagulation factors does a patient taking warfarin for his thrombotic disorder have decreased Gla (y- carboxyglutamate) residues?

A. Tissue factor
B. Factor XI
C. Factor V
D. Factor II (prothrombin)
E. Fibrinogen

38. A 65-year-old man suffers a myocardial infarction and is given tissue plasminogen activator within 6 hours of onset of the thrombosis to achieve which one of the following?

A. Prevent activation of the extrinsic pathway of coagulation

B. Inhibit thrombin

C. Enhance degradation of factors VIIIa and Va

D. Enhance fibrinolysis

E. Inhibit platelet aggregation

39. Which one of the following statements regarding platelet activation in hemostasis and thrombosis is NOT CORRECT?

A. Platelets adhere directly to subendothelial collagen via GPIa-IIa and GPVI, while binding of GPIb-IX-V is mediated via von Willebrand factor.

B. The aggregating agent thromboxane A2 is formed from arachidonic acid liberated from platelet membrane phospholipids by the action of phospholipase A2.

C. The aggregating agent ADP is released from the dense granules of activated platelets.

D. The aggregating agent thrombin activates intracellular phospholipase Cß, which forms the internal effector molecules 1,2-diacylglycerol and 1,4,5-inositol trisphosphate from the membrane phospholipid phosphatidylinositol 4,5-bisphosphate.

E. The ADP receptors, the thromboxane A2 receptor, the thrombin PAR-1 and PAR-4 receptors, and the fibrinogen GPIIb-IIIa receptor are all examples of G-protein-coupled receptors.

40. A recent surgery patient receiving warfarin therapy was found to be bleeding internally. The clotting process is impaired in this patient primarily because of which one of the following?

A. Inability of the liver to synthesize clotting factors

B. Specific inhibition of factor XIII activation

C. Inability to form clotting factor complexes on membranes

D. Reduction of plasma calcium levels

E. Enhancement of protein C activity

41.An inactivating mutation in which one of the following proenzymes would be expected to lead to thrombosis (uncontrolled blood clotting)?

A. Factor XIII

B. Prothrombin

C. Protein C

D. Factor VIII

E. Tissue factor

42. An infant is born with a severe bleeding disorder. It is quickly determined via analysis of blood components that the patient has greatly decreased levels of circulating vWF. The bleeding disorder most likely results from which one of the following as a primary cause?

A. Inability to activate factor II

B. Inability of platelets to bind to blood vessel walls

C. Inability to activate factor IX

D. Inability to activate protein C

E. Inability of platelets to bind fibrinogen

43.A patient presents with severe and prolonged bleeding following an injury, despite no known history of hereditary bleeding disorders. Laboratory tests show

significantly reduced levels of clotting factors. What is the possible biochemical explanation for this condition, which organ is primarily responsible for the production of clotting factors, and how might dysfunction in this organ affect the blood clotting process?!!!!

It might haveLiver dysfunction

The answers

1. B
2. E
3. A
4. A
5. B
6. A
7. C
8. D
9. C
10. A
11. C
12. C
13. C/G
14. D
15. C
16. C
17. C
18. C
19. B
20. B
21. C
22. C
23. E
24. A
25. B
26. B
27 B
28 B
2 .C
30. B

31. C

32. A

33. B

34. A

35. C

36. D

37. D

38. D

39. E

40. C

41. C

42. B

*إذا كان هناك شيء بحاجة لتوضيح
لا تترددوا باستفساراتكم

لا تنسوني
من صالح دعائكم