Biochemistry MCQs

Glycolysis

1. The main function of the pentose shunt is to:

(a) supply energy

(b) give the cell a back-up capability should glycolysis fail

(c) provide energy and reducing power

(d) provide pentoses and NADPH

2. End products of the pentose shunt reenter glycolysis as:

(a) glucose 6-phosphate

(b) fructose 6-phosphate + glyceraldehyde 3-phosphate

(c) fructose 1,6 bisphosphate

(d) dihydroxyacetonephosphate

3. Epinephrine triggers an increased rate of glycogen breakdown in muscle by causing:

(a) activation of hexokinase

(b) activation of glyceraldehyde 3-phosphate dehydrogenase

(c) conversion of glycogen phosphorylase b to glycogen phosphorylase a

(d) activation of pyruvate kinase

4. A coenzyme form of pantothenic acid is:

(a) lipoic acid

(b) coenzyme A (CoASH)

(c) TPP

(d) FAD

5. A coenzyme form of riboflavin is:

(a) lipoic acid

(b) coenzyme A (CoASH)

(c) TPP

(d) FAD

6. What is the net ATP yield for the conversion of one free glucose molecule to CO2 and H2O via glycolysis and the TCA cycle (assume the malate-aspartate shuttle was used)?

(a) 12

(b) 15

(c) 36

(d) 38

7. What is the net ATP yield for the conversion of one free glucose molecule to CO2 and H2O via glycolysis and the TCA cycle (assume the glycerol 3 phosphate shuttle was used)?

(a) 12

(b) 15

(c) 36

(d) 38

8. What is the net ATP yield for the conversion of one molecule of acetyl CoA to CO2 and H2O via the TCA cycle?

(a) 12

(b) 15

(c) 24

(d) 30

9. What is the net ATP yield for the conversion of one molecule of pyruvate to CO2 and H2O via the TCA cycle?

(a) 12

(b) 15

(c) 24

(d) 30

10. How many CO2's are produced during one turn of the TCA cycle?

(a) 0

(b) 1

(c) 2

(d) 3

11. How many NADH's are produced during one turn of the TCA cycle?

(a) 0

(b) 1

(c) 3

(d) 5

12. How many NADPH's are produced during one turn of the TCA cycle?

(a) 0

(b) 1

(c) 3

(d) 5

13. How many FADH2's are produced during one turn of the TCA cycle?

(a) 0

(b) 1

(c) 3

(d) 5

14. Citrate synthase and isocitrate dehydrogenase are two regulatory enzymes of the TCA cycle. These enzymes are inhibited by:

(a) AMP and/or NADH

(b) ATP and/or NADH

(c) AMP and/or NAD+

(d) ATP and/or NAD+

15. The glyoxylate cycle, in conjunction with the TCA cycle, accomplishes the:

(a) net conversion of lipid to carbohydrate

(b) complete oxidation of acetyl-CoA to CO2 plus reduced coenzymes

(c) allows for the complete oxidation of glucose

(d) produces NADPH and pentoses

16. Which of the following pathways is stimulated by epinephrine?

(a) pentose shunt

(b) glycolysis

(c) gluconeogensis

(d) TCA cycle

17. Which of the following pathways is stimulated by glucagon?

(a) pentose shunt

(b) glycolysis

(c) gluconeogenesis

(d) TCA cycle

18. Lactose intolerance involves:

(a) the inability to metabolize fructose

(b) the inability to metabolize galactose

(c) the lack of the intestinal enzyme sucrase

(d) the lack of the intestinal enzyme lactase

19. An example of gluconeogenesis is:

(a) conversion of glycogen to glucose

(b) conversion of glucose to glycogen

(c) conversion of lactic acid to glucose

(d) conversion of glucose to ribose 5-phosphate

20. Why does glucose from liver glycogen enter the blood but not from muscle glycogen?

(a) glucose cannot move out of a muscle cell

(b) free glucose is used up very rapidly in muscle cells

(c) muscle cells do not have phosphoglucomutase

(d) muscle cells do not have glucose 6-phosphatase

21. The activated form of glucose for glycogen synthesis is:

(a) glucose 1-phosphate

(b) glucose 6-phosphate

(c) glucose 1,6 bisphosphate

(d) UDP-glucose

22. The carbons from propionic acid enter the TCA cycle as:

(a) acetyl CoA

(b) -ketoglutarate

(c) succinyl CoA

(d) oxaloacetate

23. Which molecule is the immediate precursor of oxaloacetate formed during the biosynthesis of glucose form lactic acid?

(a) acetyl CoA

(b) phosphoenolpyruvate

(c) pyruvate

(d) succinate

24. Which of the following statements best describes the chemiosmotic theory of ATP synthesis by the electron transport system?

(a) As the electrons pass through the system, protons are moved from the mitochondrial matrix to the intermembrane space and ATP is formed as the protons ;move back to the matrix through the three different phosphorylation sites.

(b) As the electrons pass through the system, ATP is synthesized at three different phosphorylation sites.

(c) As the electrons pass through the system protons are moved from the mitochondrial matrix to the intermembrane space and ATP is formed as the protons move back to the matrix through only one phosphorylation site.

(d) As the protons pass through the system, electrons are moved from the mitochondrial matrix to the intermembrane space and ATP is formed as the electrons move back to the matrix through only one phosphorylation site.

25. Can ATP be formed by the electron transport system in the presence of cyanide?

(a) no

(b) yes

26. What is the P:O ratio of oxidative phosphorylation when FADH2 is oxidized by the electron transport system?

(a) the P:O ratio equals 0

(b) the P:O ratio equals 1

(c) the P:O ratio equals 2

(d) the P:O ratio equals 3

27. Oxidation of 1 mole of NADH by the electron transport system treated with 2,4 dinitrophenol would result in the formation of:

(a) 0 moles of ATP

(b) 1 mole of ATP

(c) 2 moles of ATP

(d) 3 moles of ATP

28. In oxidative phosphorylation, an uncoupling agent causes with of the following?

(a) Both respiration and phosphorylation to increase

(b) Phosphorylation to remain constant and respiration to decrease

(c) Respiration to increase and phosphorylation to decrease

(d) Respiration and phosphorylation to increase

29. Almost all of the oxygen (O2) one consumes in breathing is converted to:

(a) carbon dioxide (CO_2)

(b) carbon monoxide and then to carbon dioxide

(c) water

(d) none of the above

30. Natural uncoupling of oxidative phosphorylation in a human infant might be of physiological importance because it:

(a) allows storage of nutrients

(b) produces water

(c) increases carbon dioxide level in the blood

(d) increases body temperature

31. According to the chemiosmotic hypothesis, the driving force for ATP synthesis by oxidative phosphorylation is:

(a) a gradient of sodium ions between the matrix and cytosol

(b) an intermediate containing a high energy bond which is coupled to ATP synthesis

(c) a conformational change in a protein which transfers the inorganic phosphate to ADP

(d) a hydrogen ion (proton) gradient between the matrix and intermembrane space

32. Can the TCA cycle continue to function if the electron transport system is not functioning?

(a) no

(b) yes

33. Which of the following scientists developed the chemiosmotic hypothesis as to how the electron transport system operates?

(a) Green

(b) Lehninger

(c) Mitchell

(d) Wilson