

21. Which of the electron carriers in the electron transport chain of mitochondria would you find moving electrons through rapid lateral diffusion within the lipid bilayer of the membrane from complex I to complex III?

- a) a flavoprotein
- b) cytochrome c
- c) an iron sulfur protein
- d) *ubiquinone
- e) cytochrome a

22. What is the degree of conformational change caused by a single proton binding in the F_0 portion of the F type ATP synthase?

- a) 45 degrees
- b) *30 degrees
- c) 120 degrees
- d) 360 degrees
- e) none of the above

23. What type of redox center within the respiratory chain does not contain any non-amino acid components?

- a) cytochrome c
- b) FMN
- c) *ubiquinone
- d) none of the above
- e) all of the above

24. An uncoupling protein would do the following

- a) transport protons against a concentration gradient
- b) function as a source of heat production
- c) stop ATP synthesis
- d) decrease the rate of electron transport
- e) *both b and c

25. Glycolysis leads to the production of _____ and two molecules of ATP. In the absence of oxygen, fermentation leads to the production of _____. Glycolysis plus the citric acid cycle can convert the carbons of glucose to _____, storing the energy as ATP, _____ and _____.

- a) lactic acid, pyruvate, CO_2 , NADH, FADH_2
- b) *pyruvate, lactic acid, CO_2 , NADH, FADH_2
- c) CO_2 , lactic acid, pyruvate, FADH_2
- d) O_2 , lactic acid, pyruvate, FADH_2
- e) glucose, lactic acid, CO_2 , FADH_2

26. The inside part (analogous to the cytosol of a bacterium) of a mitochondrion is called the:

- a) cytosol
- b) stroma
- c) intermembrane space
- d) *matrix
- e) periplasm

27. Porins may be found:

- a) in the outer membrane of gram-negative bacteria
- b) in the outer membrane of chloroplasts
- c) in the outer membrane of mitochondria
- d) in the inner membrane of mitochondria
- e) * in a), b) and c) but not d)

28. The major production of ATP during aerobic metabolism occurs when electrons from _____ and _____ are transferred to _____.

- a) FADH_2 , NADH, H_2O
- b) O_2 , FADH_2 , NADH
- c) FADH_2 , O_2 , NADH
- d) NADH, O_2 , FADH_2
- e) * FADH_2 , NADH, O_2

29. The glyoxylate shunt

- a) provides extra electrons to make ATP
- b) *produces additional intermediates in the TCA cycle
- c) prepares precursors for FA synthesis
- d) prepares glucose for fermentation
- e) provides signals to neighboring cells

30. Which of the following statements about mitochondria is false?

- a) They contain an inner and an outer membrane.
- b) The region enclosed by the inner membrane is termed the matrix.
- c) They contain DNA and ribosomes.
- d) They are an important site for energy production in cells.
- e) *They contain stacked internal thylakoid membranes.

31. If you isolate mitochondria and place them in buffer with a low pH they begin to manufacture ATP. Why?

- a) Low pH increases the concentration of base causing mitochondria to pump out H^+ to the inter membrane space leading to ATP production.
- b) *The high external acid concentration causes an increase in H^+ in the inter membrane space leading to increased ATP production by ATP synthetase.
- c) Low pH increases the acid concentration in the mitochondrial matrix, a condition that normally causes ATP production.
- d) Low pH increases the OH^- concentration in the matrix resulting in ATP production by ATP synthetase.

32. The electron transport chain is located predominantly in the:

- a. Outer membrane of the mitochondria.
- b. Intermembrane space of the mitochondria.
- c. *Inner membrane of the mitochondria
- d. Matrix of the mitochondria
- e. Cytoplasm of the cell

33. What cellular compartment becomes acidic (high concentration of hydrogen ions) during mitochondrial electron transport?

- a. Mitochondrial stroma
- b. Cytoplasm.
- c. Endoplasmic reticulum.
- d. * Space between inner and outer mitochondrial membranes
- e. Thylakoid membranes

34. Synthesis of one ATP by the F-type ATPase is accomplished by:

- a. the complete rotation of the gamma subunit
- b. * a 120 degree of rotation of the gamma subunit
- c. a 180 degree of rotation of the gamma subunit
- d. substrate-level phosphorylation
- e. none of the above

35. Which of the following activities in mitochondria require proton-motive force?

- a. ATP synthesis
- b. Phosphate transport
- c. ATP transport
- d. ADP transport
- e. *all of the above