LEC 4 Q- METABOLISIM:

1. **What is the primary function of the Krebs Cycle?**
   A) To synthesize glucose
   B) To produce Acetyl-CoA
   C) To generate energy and metabolic intermediates
   D) To degrade fatty acids
   Answer: C
2. **Which of the following is NOT a source of Acetyl-CoA?**
   A) Oxidation of carbohydrates
   B) Degradation of proteins
   C) Photosynthesis
   D) Fatty acid oxidation
   Answer: C
3. **What role does oxygen play in the Krebs Cycle?**
   A) It is required directly for the cycle's reactions.
   B) It is necessary for the electron transport chain to function.
   C) It is involved in the formation of Acetyl-CoA.
   D) It inhibits the cycle.
   Answer: B
4. **Which molecule is produced directly during the Krebs Cycle through substrate-level phosphorylation?**
   A) ATP
   B) FADH2
   C) NADH
   D) GTP
   Answer: D
5. **Which enzyme catalyzes the conversion of succinate to fumarate?**
   A) Aconitase
   B) Succinate dehydrogenase
   C) Isocitrate dehydrogenase
   D) Malate dehydrogenase
   Answer: B
6. **What happens to citrate when it is produced in high concentrations?**
   A) It stimulates glycolysis.
   B) It inhibits glycolysis by binding to phosphofructokinase.
   C) It converts to malate.
   D) It enhances fatty acid oxidation.
   Answer: B
7. **Which coenzyme is tightly attached to succinate dehydrogenase and acts in the Krebs Cycle?**
   A) NAD+

B) FAD
C) CoA
D) TPP
Answer: B

8. **What is the effect of high levels of NADH on the Krebs Cycle?**
   A) It activates the cycle.
   B) It inhibits the cycle.
   C) It has no effect on the cycle.
   D) It increases the production of ATP.
   Answer: B
9. **Which enzyme of the Krebs Cycle is considered an allosteric regulator?**
   A) Citrate synthase
   B) Isocitrate dehydrogenase
   C) Succinate thiokinase
   D) Malate dehydrogenase
   Answer: A
10. **What is the significance of oxaloacetate in the Krebs Cycle?**
    A) It acts as a substrate for ATP production.
    B) It is an end product that exits the mitochondria.
    C) It is essential for the initiation of the cycle and interacts with various metabolic pathways.
    D) It is converted to glucose.
    Answer: C
11. **Which of the following statements about the Krebs Cycle is true?**
    A) It occurs in the cytoplasm of all cells.
    B) It generates ATP directly without intermediates.
    C) It is both an anabolic and catabolic pathway.
    D) It only occurs in aerobic organisms.
    Answer: C
12. **What is the significance of the high-energy thioester bond in succinyl-CoA?**
    A) It provides energy for oxidative phosphorylation.
    B) It is cleaved to produce ATP.
    C) It is used to synthesize fatty acids.
    D) It helps in the reduction of NAD+.
    Answer: B
13. **Which factor activates isocitrate dehydrogenase?**
    A) High levels of ATP
    B) High levels of NADH
    C) Calcium ions
    D) Citrate
    Answer: C
14. **What type of reaction is the conversion of malate to oxaloacetate?**
    A) Decarboxylation

B) Hydration
C) Oxidation
D) Phosphorylation
Answer: C

15. **In which part of the mitochondria does the Krebs Cycle occur?**
A) Outer mitochondrial membrane
B) Intermembrane space
C) Mitochondrial matrix
D) Inner mitochondrial membrane
Answer: C

16. **What is the result of the oxidative decarboxylation of α-ketoglutarate?**
A) Formation of citrate
B) Production of succinyl-CoA and NADH
C) Conversion to fumarate
D) Generation of GTP
Answer: B

17. **Which of the following is a product of fatty acid oxidation that enters the Krebs Cycle?**
A) Glucose
B) Acetyl-CoA
C) Pyruvate
D) Malate
Answer: B

18. **How does citrate affect glycolysis?**
A) It stimulates the pathway.
B) It has no effect.
C) It inhibits phosphofructokinase.
D) It activates hexokinase.
Answer: C

19. **What is the role of lipoic acid in the α-ketoglutarate dehydrogenase complex?**
A) It serves as a cofactor for ATP synthesis.
B) It helps in the transfer of acyl groups.
C) It binds to NAD+ during reduction.
D) It catalyzes the hydration of fumarate.
Answer: B

20. **Which reaction in the Krebs Cycle involves the reduction of FAD?**
A) Conversion of isocitrate to α-ketoglutarate
B) Oxidation of succinate to fumarate
C) Conversion of malate to oxaloacetate
D) Cleavage of succinyl-CoA
Answer: B

21. **Which of the following compounds directly initiates the Krebs Cycle by reacting with Acetyl-CoA?**

A) Citrate
B) Oxaloacetate
C) Fumarate
D) Isocitrate
Answer: B

22. **What is the net production of NADH from one complete turn of the Krebs Cycle?**
A) 1 NADH
B) 2 NADH
C) 3 NADH
D) 4 NADH
Answer: C

23. **Which enzyme is responsible for the only substrate-level phosphorylation in the Krebs Cycle?**
A) Citrate synthase
B) Succinate thiokinase
C) Isocitrate dehydrogenase
D) Malate dehydrogenase
Answer: B

24. **In which step of the Krebs Cycle is carbon dioxide released?**
A) Formation of citrate
B) Conversion of isocitrate to α-ketoglutarate
C) Conversion of succinyl-CoA to succinate
D) Conversion of malate to oxaloacetate
Answer: B

25. **How does citrate function as a metabolic regulator?**
A) It promotes glycolysis during high energy states.
B) It inhibits phosphofructokinase, reducing glycolysis.
C) It activates the electron transport chain.
D) It enhances fatty acid degradation.
Answer: B

26. **Which of the following statements is true regarding the enzyme isocitrate dehydrogenase?**
A) It catalyzes a reversible reaction.
B) It is activated by high levels of ATP.
C) It produces NADH during the conversion of isocitrate.
D) It is inhibited by low levels of calcium ions.
Answer: C

27. **What is the primary role of FAD in the Krebs Cycle?**
A) To serve as a substrate for ATP synthesis
B) To accept electrons during succinate oxidation
C) To regulate enzyme activity
D) To form acetyl-CoA from pyruvate
Answer: B

28. **Which of the following conditions will likely lead to the activation of the Krebs Cycle?**
    A) High levels of NADH and ATP
    B) Increased calcium ion concentration
    C) Low concentration of citrate
    D) High levels of fatty acids
    Answer: B
29. **What is the fate of oxaloacetate after it is formed in the Krebs Cycle?**
    A) It is converted to glucose.
    B) It can be used to regenerate citrate.
    C) It exits the mitochondria as a signaling molecule.
    D) It is converted to acetyl-CoA.
    Answer: B
30. **Which intermediate of the Krebs Cycle is a precursor for the synthesis of certain amino acids?**
    A) Fumarate
    B) Succinyl-CoA
    C) α-Ketoglutarate
    D) Citrate
    Answer: C
31. **What is the total yield of ATP equivalents from one molecule of glucose through glycolysis and the Krebs Cycle, including oxidative phosphorylation?**
    A) 30-32 ATP
    B) 18-20 ATP
    C) 36-38 ATP
    D) 24-26 ATP
    Answer: C
32. **Which of the following reactions is irreversible and highly regulated in the Krebs Cycle?**
    A) Conversion of citrate to isocitrate
    B) Conversion of succinyl-CoA to succinate
    C) Conversion of α-ketoglutarate to succinyl-CoA
    D) Conversion of malate to oxaloacetate
    Answer: C
33. **What is the primary role of the electron transport chain in relation to the Krebs Cycle?**
    A) To produce GTP directly
    B) To regenerate NAD+ and FAD
    C) To synthesize Acetyl-CoA
    D) To facilitate the conversion of citrate to isocitrate
    Answer: B
34. **In terms of energy production, what is the difference between substrate-level phosphorylation and oxidative phosphorylation?**

A) Substrate-level phosphorylation occurs in the mitochondria, while oxidative phosphorylation occurs in the cytoplasm.
B) Substrate-level phosphorylation directly produces ATP, whereas oxidative phosphorylation generates ATP through the electron transport chain.
C) Both processes occur simultaneously in the Krebs Cycle.
D) Oxidative phosphorylation is more efficient than substrate-level phosphorylation.
Answer: B

35. **Which of the following compounds is considered a signaling molecule and can inhibit glycolysis when present in excess?**
A) Oxaloacetate
B) Acetyl-CoA
C) Citrate
D) Succinyl-CoA
Answer: C
36. **What is the primary regulatory mechanism for citrate synthase?**
A) Allosteric activation by NADH
B) Feedback inhibition by citrate
C) Activation by high levels of ATP
D) Activation by calcium ions
Answer: B
37. **Which enzyme of the Krebs Cycle is located in the inner mitochondrial membrane and also functions in the electron transport chain?**
A) Aconitase
B) Isocitrate dehydrogenase
C) Succinate dehydrogenase
D) Malate dehydrogenase
Answer: C
38. **What happens to excess acetyl-CoA when the Krebs Cycle is inhibited?**
A) It is converted to glucose.
B) It is used for fatty acid synthesis.
C) It is excreted from the cell.
D) It accumulates as pyruvate.
Answer: B
39. **How does the conversion of malate to oxaloacetate contribute to the Krebs Cycle's continuity?**
A) It regenerates Acetyl-CoA.
B) It produces NADH for the electron transport chain.
C) It maintains the concentration of oxaloacetate, allowing for continuous cycling.
D) It provides ATP directly.
Answer: C
40. **Which of the following conditions would lead to an increase in the rate of the Krebs Cycle?**

A) High levels of NADH and ATP
B) High concentrations of citrate
C) Increased availability of Acetyl-CoA
D) Decreased calcium ion levels
Answer: C

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