

## LEC 14 META Q:

**1. Which of the following is NOT a component of the pyruvate dehydrogenase (PDH) complex?**

- A) E1 (Pyruvate Decarboxylase)
- B) E2 (Dihydrolipoyl Transacetylase)
- C) E3 (Dihydrolipoyl Dehydrogenase)
- D) FADH<sub>2</sub>

**2. In the PDH complex, what role does lipoic acid play during the conversion of pyruvate to acetyl-CoA?**

- A) It binds to TPP and facilitates decarboxylation.
- B) It binds the two-carbon fragment and transfers it to CoA to form acetyl-CoA.
- C) It reduces NAD<sup>+</sup> to NADH.
- D) It helps recycle NADH to NAD<sup>+</sup>.

**3. What is the effect of high NADH levels on the PDH complex?**

- A) It activates the complex.
- B) It inhibits the complex to prevent excessive acetyl-CoA production.
- C) It increases the activity of pyruvate dehydrogenase kinase.
- D) It stimulates the formation of pyruvate from lactate.

**4. Pyruvate dehydrogenase (PDH) phosphatase is activated by which of the following?**

- A) High ATP levels
- B) Calcium ions in muscle cells
- C) NADH
- D) Acetyl-CoA

**5. Which metabolic condition is primarily caused by a mutation in the E1 subunit of the pyruvate dehydrogenase complex?**

- A) Von Gierke disease
- B) Pompe disease
- C) PDH deficiency leading to congenital lactic acidosis
- D) McArdle syndrome

**6. What is the primary effect of trivalent arsenic on metabolism?**

- A) It inhibits glycolysis by binding to phosphofructokinase.
- B) It binds to lipoic acid, inhibiting the PDH complex.
- C) It inhibits the TCA cycle by deactivating succinate dehydrogenase.
- D) It activates the pyruvate dehydrogenase complex.

**7. What is the primary energy source during prolonged fasting after glycogen stores are depleted?**

- A) Glycogen
- B) Fatty acids
- C) Gluconeogenesis
- D) Protein catabolism

**8. What is the main structural feature of glycogen?**

- A) It consists primarily of beta-1,4 glycosidic bonds.
- B) It is composed of glucose residues linked by alpha-1,4 glycosidic bonds with branches formed by alpha-1,6 linkages.
- C) It is a homopolysaccharide made of ribose.
- D) It contains primarily alpha-1,2 linkages at branching points.

**9. Which enzyme is responsible for removing branches during glycogen degradation?**

- A) Glycogen phosphorylase
- B) Debranching enzyme
- C) Phosphoglucomutase
- D) Glucose-6-phosphatase

**10. What is the fate of glucose-6-phosphate in liver cells during glycogenolysis?**

- A) It is immediately converted to glucose and exported to the bloodstream.
- B) It is used in glycolysis for energy production.
- C) It is stored as glycogen.
- D) It is converted to pyruvate for the TCA cycle.

**11. Which of the following correctly describes the process of glycogenesis?**

- A) Glucose-1-phosphate is converted to UDP-glucose by UDP-glucose pyrophosphorylase.
- B) Glycogen synthase is activated by phosphorylation during the fed state.
- C) UDP-glucose is transferred to glucose-6-phosphate to form glycogen.
- D) Branching enzyme adds glucose units to form linear chains.

**12. In McArdle syndrome, which enzyme deficiency leads to the disease?**

- A) Glycogen phosphorylase in liver cells
- B) Alpha-1,4-glucosidase in lysosomes
- C) Glycogen phosphorylase in muscle cells
- D) Glucose-6-phosphatase in liver cells

**13. The most common cause of congenital lactic acidosis related to metabolic defects involves a mutation in which enzyme?**

- A) Pyruvate kinase
- B) Phosphofructokinase
- C) Pyruvate dehydrogenase complex (E1 subunit)
- D) Lactate dehydrogenase

**14. What is the primary metabolic consequence of Pompe disease?**

- A) Severe hypoglycemia due to defects in gluconeogenesis
- B) Accumulation of glycogen in lysosomal vacuoles
- C) Reduced pyruvate dehydrogenase activity leading to lactic acidosis
- D) Defective ATP production in muscle cells

**15. During muscle contraction, calcium ions play a key role in glycogenolysis by:**

- A) Activating protein kinase A (PKA) to phosphorylate glycogen synthase
- B) Stimulating glycogen phosphorylase kinase, which activates glycogen phosphorylase
- C) Inactivating glycogen phosphorylase kinase
- D) Promoting glucose uptake into the muscle cells

**Answers:**

- 1. D
- 2. B
- 3. B
- 4. B
- 5. C
- 6. B
- 7. C
- 8. B
- 9. B
- 10. A
- 11. A
- 12. C
- 13. C
- 14. B

15. B

**16. In the context of pyruvate dehydrogenase regulation, which of the following is a direct consequence of increased levels of acetyl-CoA?**

- A) Activation of pyruvate dehydrogenase phosphatase
- B) Inhibition of pyruvate dehydrogenase kinase
- C) Inhibition of the PDH complex through feedback inhibition
- D) Decreased pyruvate dehydrogenase activity in muscle cells

**17. What is the primary role of NAD<sup>+</sup> in the pyruvate dehydrogenase complex?**

- A) It serves as a cofactor for the E2 subunit to transfer the acetyl group to CoA.
- B) It is involved in the regeneration of lipoic acid during the catalytic cycle.
- C) It oxidizes the lipoamide group to regenerate the active site for further reactions.
- D) It facilitates the decarboxylation of pyruvate by stabilizing the TPP enzyme.

**18. In the context of metabolic disease, the buildup of lactate in the blood is typically associated with:**

- A) Insufficient oxygen for oxidative phosphorylation
- B) Decreased NADH to NAD<sup>+</sup> conversion
- C) Defects in the TCA cycle enzymes
- D) Inhibition of lactate dehydrogenase activity

**19. Which of the following would be the most likely outcome of a complete loss of function in the PDH complex in a developing embryo?**

- A) Decreased glucose production through gluconeogenesis
- B) Accumulation of pyruvate leading to lactic acidosis
- C) Increased pyruvate decarboxylation to acetyl-CoA
- D) Enhanced fatty acid oxidation to compensate for energy loss

**20. How does calcium signaling regulate the activity of the PDH complex in muscle cells during exercise?**

- A) Calcium directly activates pyruvate dehydrogenase kinase, thereby phosphorylating and inactivating the PDH complex.
- B) Calcium activates pyruvate dehydrogenase phosphatase, which dephosphorylates and reactivates the PDH complex.
- C) Calcium inhibits the action of acetyl-CoA, increasing the PDH complex activity.
- D) Calcium levels modulate the NADH/NAD<sup>+</sup> ratio, which in turn affects PDH complex activity.

**21. Which of the following best describes the role of the branched-chain dehydrogenase complex in metabolism?**

- A) It is responsible for converting branched-chain amino acids into acetyl-CoA for entry into the TCA cycle.
- B) It assists in the oxidative decarboxylation of branched-chain fatty acids into acetyl-CoA.
- C) It catalyzes the conversion of pyruvate into lactate under anaerobic conditions.
- D) It plays a key role in the conversion of glucose-1-phosphate to UDP-glucose.

**22. Which enzyme is responsible for transferring the two-carbon acetyl group from lipoamide to CoA in the PDH complex?**

- A) Pyruvate decarboxylase
- B) Dihydrolipoyl dehydrogenase
- C) Dihydrolipoyl transacetylase
- D) Lipoamide acetyltransferase

**23. What is the effect of high levels of glucagon on the pyruvate dehydrogenase complex in liver cells?**

- A) It activates the PDH complex by promoting dephosphorylation.
- B) It promotes the phosphorylation of PDH, leading to its inactivation.
- C) It enhances acetyl-CoA production to support gluconeogenesis.
- D) It stimulates the PDH complex through an increase in calcium ion concentration.

**24. In the PDH complex, which of the following is true about the cofactor thiamine pyrophosphate (TPP)?**

- A) TPP directly catalyzes the transfer of the two-carbon acetyl group to CoA.
- B) TPP facilitates the decarboxylation of pyruvate in the E1 subunit.
- C) TPP is required by the E3 subunit to regenerate NADH from NAD<sup>+</sup>.
- D) TPP is involved in the reduction of lipoamide in the E2 subunit.

**25. What happens in the liver when there is a complete defect in glucose-6-phosphatase?**

- A) The liver cannot produce glucose for systemic use, leading to hypoglycemia.
- B) The liver accumulates excess glycogen, causing hepatomegaly.
- C) The TCA cycle is unable to process glucose, leading to severe metabolic acidosis.
- D) The liver produces excessive lactate, causing metabolic acidosis.

**26. In McArdle disease, what metabolic problem is most directly caused by a deficiency in muscle glycogen phosphorylase?**

- A) Inability to release glucose from glycogen during exercise, leading to muscle weakness.
- B) Inability to convert pyruvate to acetyl-CoA, leading to lactic acidosis.
- C) Failure to oxidize fatty acids, resulting in excessive ketone body formation.
- D) Blockage of gluconeogenesis, leading to fasting hypoglycemia.

**27. The debranching enzyme in glycogen metabolism has which of the following activities?**

- A) It transfers a glucose unit from a branch to the linear chain and hydrolyzes the  $\alpha$ -1,6 linkage.
- B) It removes glucose from the non-reducing end of the glycogen molecule to produce glucose-6-phosphate.
- C) It catalyzes the formation of  $\alpha$ -1,6 linkages during glycogen synthesis.
- D) It transfers phosphate groups from glycogen to glucose-6-phosphate.

**28. How does a mutation in the E2 subunit of the PDH complex affect pyruvate metabolism?**

- A) It causes a loss of the acetyl-CoA transfer function, preventing entry into the TCA cycle.
- B) It inhibits the decarboxylation of pyruvate, leading to an accumulation of pyruvate.
- C) It increases the production of NADH, causing feedback inhibition of the PDH complex.
- D) It blocks the regeneration of lipoic acid, disrupting the cycle of the PDH complex.

**29. What metabolic condition would most likely result from a defect in the enzyme glucose-6-phosphatase in the liver?**

- A) Accumulation of glucose-6-phosphate leading to hyperglycemia
- B) Impaired gluconeogenesis and glycogenolysis, leading to hypoglycemia
- C) Excessive glycogen breakdown, leading to hepatomegaly
- D) Increased ketogenesis due to decreased glucose availability

**30. The accumulation of NADH in the cell typically leads to which of the following effects on the PDH complex?**

- A) Activation of the complex through allosteric modulation
- B) Increased phosphorylation and inactivation of the PDH complex
- C) Decreased pyruvate conversion to acetyl-CoA
- D) Increased levels of acetyl-CoA for fatty acid synthesis

**Answers:**

- 16. C
- 17. C
- 18. A
- 19. B

- 20. B
- 21. A
- 22. C
- 23. B
- 24. B
- 25. A
- 26. A
- 27. A
- 28. A
- 29. B
- 30. B

**31. In the PDH complex, which cofactor is responsible for accepting the acetyl group from the hydroxyethyl-TPP intermediate in the E1 subunit?**

- A) Coenzyme A (CoA)
- B) Lipoamide
- C) NAD<sup>+</sup>
- D) FAD

**32. The activity of pyruvate dehydrogenase kinase is inhibited by high levels of which of the following molecules?**

- A) Acetyl-CoA
- B) ATP
- C) NADH
- D) Calcium ions

**33. Which of the following best describes the role of the TCA cycle in regulating the activity of the PDH complex?**

- A) It directly phosphorylates and inhibits the PDH complex through feedback inhibition by NADH and acetyl-CoA.
- B) It generates ATP, which activates the PDH complex to promote acetyl-CoA production.
- C) It provides NADH and FADH<sub>2</sub> for electron transport, increasing the activity of PDH.
- D) It suppresses the PDH complex through the accumulation of citrate, an intermediate of the cycle.

**34. Which metabolic pathway is directly linked to the activity of the pyruvate dehydrogenase complex, producing the high-energy intermediate acetyl-CoA?**

- A) Gluconeogenesis
- B) Glycolysis
- C) Beta-oxidation of fatty acids
- D) Pentose phosphate pathway

**35. In the regulation of pyruvate dehydrogenase complex, which of the following is true regarding the role of pyruvate dehydrogenase phosphatase (PDP)?**

- A) It inhibits the activity of the PDH complex by phosphorylating its subunits.
- B) It activates the PDH complex by dephosphorylating and reactivating it.
- C) It is activated by high concentrations of NADH.
- D) It converts acetyl-CoA to citrate, enhancing PDH activity.

**36. In a condition where there is a defect in the enzyme dihydrolipoyl dehydrogenase (E3), which of the following is most likely to occur?**

- A) Accumulation of lipoamide in its reduced form
- B) Inhibition of the decarboxylation of pyruvate
- C) Impaired reduction of NAD<sup>+</sup> to NADH
- D) Decreased production of ATP through oxidative phosphorylation

**37. Which enzyme in the TCA cycle is directly responsible for converting succinate to fumarate?**

- A) Succinate dehydrogenase
- B) Malate dehydrogenase
- C) Fumarase
- D) Aconitase

**38. What is the effect of an elevated NADH/NAD<sup>+</sup> ratio in the cell on the PDH complex?**

- A) Activation of pyruvate dehydrogenase phosphatase
- B) Inhibition of pyruvate dehydrogenase kinase
- C) Increased inhibition of the PDH complex through phosphorylation
- D) Enhancement of the PDH complex activity for acetyl-CoA production

**39. Which of the following is most likely to occur when there is a defect in the E1 subunit of the pyruvate dehydrogenase complex?**

- A) Reduced activity of the TCA cycle due to insufficient acetyl-CoA production
- B) Decreased ATP production through oxidative phosphorylation
- C) Accumulation of pyruvate and lactate leading to metabolic acidosis
- D) Enhanced breakdown of fatty acids to compensate for the energy deficiency

**40. What is the effect of a mutation that reduces the activity of pyruvate dehydrogenase kinase on glucose metabolism?**



- A) Increased conversion of glucose to lactate due to reduced PDH inhibition
- B) Decreased glucose conversion to acetyl-CoA, limiting entry into the TCA cycle
- C) Increased production of glucose through gluconeogenesis
- D) Enhanced fatty acid synthesis from acetyl-CoA

**41. The breakdown of glycogen to glucose-1-phosphate is initiated by which enzyme?**

- A) Glycogen synthase
- B) Glycogen phosphorylase
- C) Debranching enzyme
- D) Phosphoglucomutase

**42. What is the role of the NADH produced in the pyruvate dehydrogenase complex?**

- A) It directly participates in the decarboxylation of pyruvate.
- B) It is used in the electron transport chain for ATP production.
- C) It activates pyruvate dehydrogenase kinase to inhibit the PDH complex.
- D) It reduces acetyl-CoA to form citrate for the TCA cycle.

**43. Which of the following is a major consequence of PDH complex deficiency in the brain during early development?**

- A) Decreased glucose uptake into the brain
- B) Impaired fatty acid oxidation leading to a lack of ATP
- C) Impaired oxidative phosphorylation and increased lactate production
- D) Increased ketone body synthesis as a compensatory mechanism

**44. Which of the following molecules would increase the activity of the pyruvate dehydrogenase complex?**

- A) High levels of acetyl-CoA
- B) High levels of NADH
- C) High levels of ADP
- D) High levels of glucose

**45. How does pyruvate enter the mitochondria for conversion by the PDH complex?**

- A) Through diffusion across the inner mitochondrial membrane
- B) Via the pyruvate-proton symporter in the inner mitochondrial membrane
- C) Through active transport using ATP energy
- D) Via facilitated diffusion through aquaporins

**46. What would be the effect of a mutation in the enzyme pyruvate carboxylase on metabolism?**

- A) Reduced gluconeogenesis, as pyruvate cannot be converted into oxaloacetate.
- B) Increased pyruvate to acetyl-CoA conversion, leading to excess ketone body production.
- C) Enhanced glucose uptake into the liver to compensate for the lack of acetyl-CoA.
- D) Decreased lactate production, as pyruvate is directed toward the TCA cycle.

**47. In the presence of excess glucose, which of the following would occur in the liver to maintain homeostasis?**

- A) Decrease in glycolytic flux and increase in gluconeogenesis
- B) Inhibition of glycogen synthesis and increased ketone body formation
- C) Activation of the pyruvate dehydrogenase complex to enhance acetyl-CoA production
- D) Increased conversion of acetyl-CoA to fatty acids and storage in adipose tissue

**48. A patient with a defect in the enzyme lipoamide dehydrogenase would most likely present with which of the following metabolic issues?**

- A) A build-up of lactate due to impaired oxidative decarboxylation of pyruvate
- B) Decreased ATP production from the electron transport chain
- C) Accumulation of acetyl-CoA in tissues
- D) Impaired glycolysis due to lack of NADH regeneration

**49. In mitochondrial disorders, what is a likely outcome of defective pyruvate dehydrogenase complex activity in muscle cells?**

- A) Increased ATP production due to higher reliance on oxidative phosphorylation
- B) Decreased fatty acid oxidation and increased lactate production during exercise
- C) Enhanced glycolysis to compensate for impaired mitochondrial function
- D) Increased breakdown of muscle protein to supply energy for TCA cycle activity

**50. Which of the following would most likely increase during periods of fasting as a compensatory mechanism for decreased glucose availability?**

- A) Glycogen breakdown to produce glucose-6-phosphate
- B) Pyruvate decarboxylation to acetyl-CoA in muscle cells
- C) Ketone body production from fatty acids in the liver
- D) Increased lactate production from anaerobic glycolysis

**Answers:**

31. B

- 32. D
- 33. A
- 34. B
- 35. B
- 36. A
- 37. A
- 38. C
- 39. A
- 40. A
- 41. B
- 42. B
- 43. C
- 44. C
- 45. B
- 46. A
- 47. C
- 48. A
- 49. B
- 50. C

**51. Which of the following statements best explains the biochemical rationale for the conversion of pyruvate to acetyl-CoA by the PDH complex in relation to cellular energy needs?**

- A) Acetyl-CoA is primarily used for the synthesis of nucleotides and amino acids.
- B) Acetyl-CoA enters the TCA cycle to generate ATP via oxidative phosphorylation.
- C) Pyruvate is converted to acetyl-CoA to ensure adequate NADH production in anaerobic conditions.
- D) Acetyl-CoA is used to synthesize ketone bodies during periods of excess glucose metabolism.

**52. Which of the following would lead to the activation of pyruvate dehydrogenase phosphatase (PDP)?**

- A) High levels of NADH and acetyl-CoA
- B) High intracellular calcium concentration during muscle contraction
- C) Low levels of ATP and high levels of glucose
- D) A decrease in mitochondrial membrane potential

**53. In patients with pyruvate dehydrogenase complex deficiency, what metabolic change would most likely be observed in their tissues?**

- A) Decreased rate of glycolysis and excessive pyruvate conversion to lactate
- B) Increased conversion of pyruvate to oxaloacetate and impaired gluconeogenesis
- C) A shift from aerobic to anaerobic metabolism leading to increased lactate production
- D) Increased beta-oxidation of fatty acids to compensate for the lack of acetyl-CoA

**54. In the regulation of the pyruvate dehydrogenase complex, which molecule is known to act as an allosteric inhibitor of the complex, signaling that the cell's energy needs are met?**

- A) Coenzyme A (CoA)
- B) Acetyl-CoA
- C) NAD<sup>+</sup>
- D) ADP

**55. During exercise, muscle cells rely on which of the following mechanisms to ensure sufficient ATP production when pyruvate dehydrogenase complex activity is limited?**

- A) Increased fatty acid oxidation to provide acetyl-CoA for the TCA cycle
- B) Increased reliance on anaerobic glycolysis to generate ATP through lactate production
- C) Enhanced pyruvate carboxylase activity to direct pyruvate to gluconeogenesis
- D) Increased ketogenesis to provide ketone bodies as an alternative fuel source

**56. Which of the following best describes the action of pyruvate dehydrogenase kinase (PDK) in the regulation of the PDH complex?**

- A) PDK activates the PDH complex by dephosphorylating its subunits.
- B) PDK inactivates the PDH complex by phosphorylating its E1 subunit, reducing acetyl-CoA production.
- C) PDK enhances PDH activity by increasing the supply of NADH and ATP.
- D) PDK acts as a feedback inhibitor, reducing acetyl-CoA synthesis in response to high glucose levels.

**57. The enzyme succinate dehydrogenase, which participates in both the TCA cycle and the electron transport chain, is located in which part of the cell?**

- A) Cytoplasm
- B) Mitochondrial outer membrane
- C) Mitochondrial matrix
- D) Inner mitochondrial membrane

**58. Which condition is most likely to result from a defect in the enzyme dihydrolipoamide dehydrogenase (E3), a component of the pyruvate dehydrogenase complex?**

- A) Reduced production of acetyl-CoA from pyruvate, leading to decreased energy production
- B) Increased acetyl-CoA accumulation due to impaired oxidative decarboxylation
- C) Inability to synthesize ATP through oxidative phosphorylation
- D) Increased formation of pyruvate as a consequence of defective pyruvate transport

**59. What is the likely consequence of a mutation in the gene encoding for the TPP-binding site of the pyruvate dehydrogenase E1 subunit?**

- A) Reduced activity of the pyruvate dehydrogenase complex and impaired acetyl-CoA production
- B) Increased production of lactate due to shunting of pyruvate to anaerobic pathways
- C) Enhanced conversion of glucose to acetyl-CoA, leading to excess fatty acid synthesis
- D) Accumulation of pyruvate in the cytoplasm as it cannot enter the mitochondria efficiently

**60. Which of the following molecules would most likely be used to treat a metabolic disorder caused by pyruvate dehydrogenase complex deficiency, aimed at bypassing the defect?**

- A) Dinitrophenol to increase mitochondrial membrane permeability
- B) Lipoic acid as a cofactor to stabilize E3 function
- C) Ketone bodies to provide an alternative fuel source for brain and muscle cells
- D) Glucose supplements to stimulate insulin secretion and promote glycolysis

**61. The citric acid cycle's intermediate, oxaloacetate, can be replenished by which of the following processes when it is used up in the cycle?**

- A) Gluconeogenesis from lactate
- B) Conversion of pyruvate to oxaloacetate via pyruvate carboxylase
- C) Beta-oxidation of fatty acids to form acetyl-CoA
- D) Deamination of amino acids to form alpha-ketoglutarate

**62. Which of the following statements is most accurate regarding the function of the pyruvate dehydrogenase complex in mitochondria?**

- A) It acts as the primary site for glucose oxidation during anaerobic respiration.
- B) It catalyzes the irreversible conversion of pyruvate into acetyl-CoA, linking glycolysis to the TCA cycle.
- C) It is located on the inner mitochondrial membrane and generates ATP directly.
- D) It provides energy for fatty acid synthesis by converting glucose into long-chain fatty acids.

**63. What is the role of NADH in the electron transport chain following the activity of the pyruvate dehydrogenase complex?**

- A) NADH is used to reduce oxygen molecules to form water.
- B) NADH provides electrons that are transferred to Complex I of the electron transport chain.
- C) NADH inhibits the electron transport chain when the cell's ATP levels are high.
- D) NADH is converted into NAD<sup>+</sup> for re-entry into glycolysis and the TCA cycle.

**64. How does the presence of elevated acetyl-CoA levels affect the pyruvate dehydrogenase complex?**

- A) Acetyl-CoA enhances the activity of the PDH complex by increasing the levels of NADH.
- B) High acetyl-CoA levels act as an allosteric inhibitor, signaling sufficient energy supply and downregulating the PDH complex.
- C) Acetyl-CoA directly activates pyruvate carboxylase, promoting gluconeogenesis.
- D) Acetyl-CoA stimulates the accumulation of citrate, which accelerates PDH activity.

**65. Which of the following processes would be most affected in cells with impaired pyruvate dehydrogenase activity?**

- A) Fatty acid oxidation and ketogenesis
- B) Glycolysis and NADH production
- C) Gluconeogenesis and glucose utilization
- D) TCA cycle flux and oxidative phosphorylation

**66. What would likely occur in a person with a genetic defect in the gene encoding pyruvate dehydrogenase kinase?**

- A) The PDH complex would be continuously active, leading to excessive acetyl-CoA production.
- B) The PDH complex would remain inactive due to an inability to deactivate pyruvate dehydrogenase.
- C) Gluconeogenesis would be impaired, leading to low glucose production.
- D) ATP synthesis would decrease due to decreased activity of the TCA cycle.

**67. In the TCA cycle, which enzyme is responsible for catalyzing the conversion of malate to oxaloacetate?**

- A) Malate dehydrogenase
- B) Fumarase
- C) Succinyl-CoA synthetase
- D) Citrate synthase

**68. Which of the following is the most direct consequence of excessive acetyl-CoA accumulation in the liver?**

- A) Increased production of glucose through gluconeogenesis
- B) Enhanced ketone body production and accumulation in the blood
- C) Inhibition of fatty acid synthesis due to feedback inhibition
- D) Increased oxidative phosphorylation efficiency to generate more ATP

**69. In patients with pyruvate dehydrogenase complex deficiency, what would be the most likely form of energy metabolism in brain cells?**

- A) Increased glucose oxidation through glycolysis and the TCA cycle
- B) Increased ketone body utilization due to impaired pyruvate-to-acetyl-CoA conversion
- C) Shift to fatty acid oxidation as the main energy source
- D) Increased lactate production due to an inability to oxidize pyruvate

**70. What is the most likely outcome of long-term fasting on the activity of the pyruvate dehydrogenase complex?**

- A) Decreased activity due to increased acetyl-CoA levels
- B) Increased activity as the body shifts to aerobic glycolysis for energy
- C) Enhanced activity of pyruvate dehydrogenase kinase to inhibit the PDH complex
- D) Inactivation of the PDH complex to conserve glucose for other tissues

**Answers:**

- 51. B
- 52. B
- 53. C
- 54. B
- 55. A
- 56. B
- 57. D
- 58. A
- 59. A
- 60. C
- 61. B
- 62. B
- 63. B
- 64. B
- 65. D
- 66. A
- 67. A
- 68. B
- 69. B
- 70. A

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