**CARBGAME – DIABETIC KETOACIDOSIS**

**CARD QUESTIONS: ANSWER KEY**

**1. D**

**2. C**

**3. A**

**4. B**

**5. A**

**6. B**

**7. C**

**8. B**

**9. B**

**10. B**

**11. C**

**12. A**

**13. A**

**14. B**

**15. C**

**16. C**

**17. C**

**18. A**

**19. B**

**20. C**

**21. A**

**22. D**

**23. A**

**24. A**

**25. C**

**BOARD QUESTIONS : ANSWER KEY**

**1. Give two causes of Ketosis.**

Uncontrolled diabetes mellitus

Starvation

**2. DKA is more commonly seen in individuals with which type of diabetes?**

Ans: Type 1

**3. Give the three cardinal features of Ketosis.**

Ketonemia, Ketonuria, Smell of acetone in breath

**4. Name the primary ketone body/bodies**

Ans: Acetoacetate

**5. CARD**

**6. How will you detect ketone bodies in urine?**

Rothera’s test, Gerhard’s Test

**7. Give any 3 sources of acetyl Co-A?**

Ans: Fatty acids, Pyruvate, Ketogenic amino acids, ethanol, acetoacetate and beta-hydroxy butyrate (ketolysis)

**8. The presence of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ breath is a characteristic odor associated with DKA.**

Ans: acetone

9. NONE

10. CARD

**11. Kussmaul’s breathing is a slow and shallow breathing pattern seen in DKA. True/False**

False: Rapid

**12. CARD**

**13. Give the full form of HMG Co-A**

Ans: Beta Hydroxy-Beta-methylglutaryl-Coenzyme A

**14. I am essential for the metabolism of Fat. Who am I?**

**SEYADCTAROHRB**

Ans: CARBOHYDRATES

**15. Name the secondary ketone bodies**

Ans: Beta hydroxybutyrate and Acetone

16. NONE

17. NONE

**18. Where are ketone bodies produced in the body?**

Ans: Mitochondria of Liver

**19. NONE**

**20. CARD**

**21. How does the anion gap change in Diabetic Ketoacidosis?**

Ans: Increased

22. CARD

**23. Which enzyme is responsible for the conversion of acetyl-CoA to acetoacetate in ketogenesis?**

Ans: Acetoacetyl Co-A synthase

**24. What is the product of the lysis of HMG-Co-A?**

Ans: Acetoacetate

25. NONE

**26. Name the reagents used in Rothera’s Test**

Solid ammonium sulfate

Sodium nitroprusside

Liquor ammonia

27. NONE

**28. Oxidation of acetyl Co-A to Acetoacetic acid is the first step of ketogenesis. True/False**

Ans: False – Two molecules of acetyl Co-A condense to form one molecule of Acetoacetic acid

**29. CARD**

**30. During ketogenesis, what is the primary substrate for the production of ketone bodies?**

Ans: Acetyl Co-A

31. CARD

**32. During early pregnancy, ketosis can be caused due to**

Hyperemesis

33. NONE

**34. Name the enzyme which converts acetoacetate to acetoacetyl Co-A**

Thiophorase

35. NONE

**36. Give the normal range of Serum Potassium.**

3.5 – 5.5 mEql/L

37. CARD

**38. How does insulin therapy affect potassium levels and what are its effects?**

Insulin facilitates the uptake of glucose into cells, and concurrently, it promotes the movement of potassium into the cells as well. As insulin drives glucose and potassium into cells, it can cause a shift of potassium from the extracellular fluid (bloodstream) into the intracellular space causing a decrease in serum potassium levels. This Hypokalemia can lead to cardiac arrhythmias, including potentially life-threatening ventricular arrhythmias like ventricular tachycardia or ventricular fibrillation

**39. Which ketone body is produced in the highest quantity during ketogenesis?**

Ans: Beta hydroxy butyrate

**40. NONE**

**41. CARD**

**42. Give the normal level of ketone bodies in the blood.**

Less than 1 mg/dL

43. NONE

**44. Which clinical manifestation is a result of the compensatory respiratory response to metabolic acidosis in DKA?**

Kussmaul’s’ respiration

**45. Which reaction converts acetoacetate to beta-hydroxybutyrate?**

Ans: Dehydrogenation (Reduction)

46. CARD

47. NONE

**48. In DKA, why acetyl Co-A which is formed in excess as a result of beta-oxidation cannot enter the TCA cycle?**

Enhanced gluconeogenesis restricts the oxidation of acetyl Co-A by the TCA cycle since the availability of oxaloacetate is less.

49. CARD

**50. What is the primary reason behind the elevated anion gap observed in DKA?**

Accumulation of ketones

**51. Why does ketogenesis occur only in the liver?**

Ans: Because the enzyme HMG Co-A lyase is present only in the liver

**52. Describe the fate of oxaloacetate during conditions of uncontrolled diabetes mellitus.**

The oxaloacetate is channeled to gluconeogenesis, making it unavailable/reduced thereby inhibiting the TCA cycle from functioning optimally.

53. NONE

54. CARD

**55. Under conditions of prolonged fasting, what proportion of energy produced by the ketone bodies is used by other organs (excluding the brain)**

30-35%

**56. What is the primary product of ketolysis in peripheral tissues?**

Acetyl Co-A

**57. Which tissues prefer ketone bodies to glucose?**

Heart muscles and renal cortex

**58. CARD**

**59. NONE**

**60. Which HMG-CoA synthase is used for ketogenesis?**

Ans: Mitochondrial HMG-CoA synthase

61. CARD

**62. In the pathophysiology of DKA, which hormone plays a central role in promoting ketogenesis?**

Glucagon

**63. NONE**

**64. Which type of acid-base disturbance does ketosis cause?**

High Anion Gap Metabolic Acidosis

**65. CARD**

**66. NONE**

**67. NONE**

**68. CARD**

**69. Which metabolic state is most conducive to ketogenesis?**

Fasting state

70. NONE

**71. What role does carnitine play in ketogenesis?**

Facilitates transport of fatty acids into the mitochondria

72. CARD

73, NONE

**74. Which is the most preferred fuel for brain?**

Glucose

75. NONE

**76. Which neurological complication associated with DKA is most common in children?**

Cerebral edema

**77. CARD**

**78. Name the amino acids from which acetoacetate can be formed by the degradation of the carbon skeleton.**

Ans: Leucine, Lysine, Phenylalanine and Tyrosine

**79. CARD**

**80. What effect does insulin have on ketogenesis?**

Inhibits ketogenesis.

**81. What determines the ratio between acetoacetate and beta-hydroxy butyrate?**

Ans: Cellular NAD:NADH ratio

82. NONW

**83. How do increased levels of Malonyl Co-A affect Ketogenesis?**

Increased levels of Malonyl Co-A will INHIBIT the activity of Carnitine Acyl Transferase 1 (CAT-1) resulting in reduced beta-oxidation and subsequently acetyl Co-A production. Therefore, increased Malonyl Co-A decreases Ketogenesis

84. CARD

85. NONE

86. NONE

87. CARD

**88. How is sodium level in the body affected during diabetic ketoacidosis?**

In diabetic ketoacidosis (DKA), dehydration from osmotic diuresis leads to relative hyponatremia. The absolute loss of water exceeds the loss of sodium, causing a dilutional decrease in blood sodium concentration.

**89. Give the expansion of SCOT (enzyme)**

Succinyl-Co-A:3-ketoacid Co-A Transferase

**90. CARD**

**91. How will you evaluate (Laboratory tests) a patient with suspected Diabetic Ketoacidosis?**

1. Rothera’s test
2. Blood Glucose estimation
3. Serum electrolytes
4. Arterial Blood Gas analysis
5. Urea Estimation

**92. How will you manage a patient with severe diabetic ketoacidosis?**

Fluid Resuscitation

Insulin & Glucose Therapy

Potassium monitoring

Administration of Bicarbonate

Continuous monitoring

93. CARD

**94. How will you differentiate starvation and diabetic ketoacidosis with Urine analysis?**

The urine of a patient with diabetic ketoacidosis will have positive Benedict's test as well as Rothera's test but in starvation ketosis Benedict’s test is negative but Rothera’s will be positive.

95. CARD

**96. What is the mechanism behind osmotic diuresis in diabetic ketoacidosis?**

In diabetic ketoacidosis (DKA), the combination of hyperglycemia and ketonuria leads to osmotic diuresis. Elevated blood glucose levels overwhelm the kidneys' ability to reabsorb glucose completely. Simultaneously, the presence of ketones in the urine, a result of increased fatty acid breakdown, enhances the osmotic effect. Glucose and ketones create an osmotic gradient, drawing water into the urine. This dual effect increases urine production, leading to excessive loss of water and electrolytes. Osmotic diuresis is a key contributor to dehydration, electrolyte imbalances, and the characteristic polyuria (excessive urine production) seen in DKA.

**97. CARD**

**98. NONE**

**99. CARD**

**100. WINNING CARD**