

## CARBOHYDRATES METABOLISM MCQs-II

1. Which of the following is used as a source of reducing power for biosynthesis?
  - a) NADH
  - b) proton motive force
  - c) ATP
  - d) NADPH
  - e) malonyl-CoA
2. Glycolysis results in the net production, per original hexose of:
  - a) 2ATP + 2NADH
  - b) 4ATP + 2NADH
  - c) 2ATP + NADH
  - d) 4ATP + NADH
3. Phosphofructokinase:
  - a) converts fructose to fructose-1-P
  - b) converts fructose to fructose-6-P
  - c) converts fructose-6-P to fructose diphosphate
  - d) converts fructose-1-P to fructose-6-P
4. The type of enzyme which moves a phosphate group from one position to another on the same molecule is a:
  - a) racemase
  - b) epimerase
  - c) kinase
  - d) mutase
  - e) phosphorylase
5. Glycolysis results in the net production, per original hexose of:
  - a) 2ATP + 2NADH
  - b) 4ATP + 2NADH
  - c) 2ATP + NADH
  - d) 4ATP + NADH
  - e) 2ATP + 2FADH<sub>2</sub>
6. The hexose monophosphate pathway is used for the production of
  - a) ATP
  - b) NADPH
  - c) NADH
  - d) acetyl-CoA
  - e) none of the above

7. Thiamine pyrophosphate participates in which type of reaction?

- a) electron transfer
- b) oxidative decarboxylation
- c) methyl transfer
- d) ATP-dependent carboxylation

8. Which of the following metabolites can NOT be a substrate for gluconeogenesis?

- a) Succinate
- b) Acetate
- c) Lactate
- d) Alanine
- e) Glutamate

9. Glycogen synthesis

- a) involves linking of glucose through a 1-4 glycosidic bonds.
- b) results in a long unbranched polymer of glucose.
- c) involves a single enzyme: glycogen synthase.
- d) is of importance only in the liver.
- e) is stimulated by binding of epinephrine to hepatocytes

10. In the glycogen storage disease in which liver phosphorylase is deficient, hypoglycemia is less severe than when glucose-6-phosphatase is deficient. An explanation for this fact is that

- a) glucagon activates phosphorylase but not glucose-6-phosphatase.
- b) the liver can supply the blood with glucose via the gluconeogenesis pathway even if phosphorylase is deficient, but it cannot do so if glucose-6-phosphatase is deficient
- c) hexokinase is rate-limiting in the conversion of liver glycogen to blood glucose
- d) glucose that is formed from fatty acids can leave the liver if glucose-6-phosphatase is present
- e) glycolysis cannot occur if phosphorylase is deficient

11. A carbohydrate having (a) beta 1,4 glycosidic linkage(s) is:

- a) amylose.
- b) sucrose
- c) maltose.
- d) glycogen.
- e) lactose.

12. Insulin promotes glycogen synthesis in the liver by:

- a) inhibiting glycogen synthase
- b) binding to phosphorylase
- c) causing the dephosphorylation of both phosphorylase and glycogen synthase
- d) activating phosphorylase
- e) facilitating the transport of glucose into the cell.

13. Which type of enzyme can supply the citric acid cycle with oxaloacetate from pyruvate?
- an isomerase
  - a mutase
  - a ligase
  - a kinase
  - a lyase
14. Which is an unlikely metabolic fate of glucose-6-phosphate in muscle?
- Conversion to fructose-6-phosphate.
  - Conversion to glucose-1-phosphate.
  - Hydrolysis to dihydroxyacetone phosphate and glyceraldehyde-3-phosphate
  - Hydrolysis to glucose
  - Conversion to lactate
15. The following statements concerning phosphorylase is INCORRECT
- The active enzyme catalyzes the reaction:  $(\text{glucose})_n + \text{Pi} \rightarrow (\text{glucose})_{n-1} + \text{Glucose-1-P}$
  - The enzyme is activated by phosphorylation
  - Phosphorylation of phosphorylase in muscle is controlled by glucagon.
  - The phosphorylation of phosphorylase and of glycogen synthase is catalyzed by a protein kinase
  - The phosphorylation of phosphorylase is increased by high concentrations of cAMP
16. What is the net yield of NADH when 1 mole of glucose 6-phosphate is oxidized by aerobic glycolysis to yield pyruvate?
- 0 mole NADH
  - 1 mole NADH
  - 2 mole NADH
  - 3 mole NADH
17. In glycogen metabolism
- glycogen synthase forms alpha-1, 4-glycosidic bonds
  - debranching enzyme produces free glucose from glycogen
  - both A and B are true
  - none of the above
18. Inhibited by glucose-6-phosphate
- Glucokinase
  - Hexokinase
  - Both A and B are true
  - None of the above
19. Gluconeogenesis from glycerol:
- occurs in the liver.
  - requires the formation of phosphoenolpyruvate
  - requires an enzyme to phosphorylate glycerol
  - requires an active phosphofructokinase
  - both a & b

20. Hereditary deficiency of glucose 6-phosphate dehydrogenase in erythrocytes is harmful because it leads to

- a) decreased NADPH level
- b) decreased level of reduced glutathione
- c) increased peroxidation of membranes.
- d) increased rate of hemolysis under oxidative stress
- e) all of the above

21. All of the following are positive effectors of gluconeogenesis EXCEPT

- a) ATP
- b) Citrate
- c) Acetyl CoA
- d) Alanine
- e) AMP

22. De novo glycogen synthesis occurs using which of the following as a primer?

- a) Preexisting glycogen molecules
- b) Lactose
- c) Glycosylated glycogenin
- d) Free glucose

23. The immediate donor of glucose units in the synthesis of glycogen is

- a) Glucose
- b) Glucose-1-phosphate
- c) Glucose-6-phosphate
- d) UDP-glucose
- e) Mannose

24. Mitochondrial oxidation increases the yield of ATP from glucose when compared to anaerobic glycolysis by about

- a) 3 fold
- b) 5 fold
- c) 10 fold
- d) 20 fold
- e) 50 fold

25. Its primary function is glucose homeostasis

- a) Tricarboxylic acid cycle
- b) Cardiac gluconeogenesis
- c) Hepatic pentose phosphate shunt
- d) Hepatic glycogenolysis
- e) Skeletal muscle synthesis of glucose-6-phosphate

26. Glucokinase:

- a) has a higher affinity for glucose than hexokinase
- b) is induced during fasting
- c) is found in the liver
- d) is inhibited by glucose-6-phosphate.

27. Under anaerobic conditions, working muscle carries out glycolysis resulting in ATP and lactic acid formation. The production of lactate is necessary due to limiting supplies of \_\_\_\_\_ in the cell.

- a) ADP
- b) pyruvate
- c) glucose
- d) NAD<sup>+</sup>
- e) NADH

28. The following enzyme(s) is/are required to synthesize phosphoenol-pyruvate from pyruvate in gluconeogenesis

- a) pyruvate kinase
- b) pyruvate carboxylase and phosphoenolpyruvate carboxykinase
- c) fructose-1,6-bisphosphatase and glucose-6-phosphatase
- d) pyruvate dehydrogenase

29. All of the following are involved in the pyruvate dehydrogenase complex EXCEPT

- a) NAD.
- b) lipoic acid.
- c) thiamine pyrophosphate
- d) pyridoxal phosphate
- e) coenzyme A

30. Hepatic glycogenolysis is a primary source of glucose during

- a) the well-fed state (2-3 hours after a meal).
- b) the early fasted state (3 -12 hours after a meal)
- c) the fasted state (12-36 hours after a meal).
- d) the early refed state (0-2 hours after refeeding).

31. A principal source of NADPH that can be used for cholesterol synthesis is generated during the conversion of

- a) acetyl-CoA to malonyl-CoA
- b) citrate to acetyl-CoA and oxaloacetate
- c) glucose 6-phosphate to 6-phosphogluconate
- d) oxaloacetate to malate
- e) ribulose 5-phosphate to ribose 5-phosphate

32. The products of oxidation of one mole of glucose 6-phosphate through the initial portion of the pentose phosphate pathway are

- a) one mole of ribulose 5-phosphate, one mole of carbon dioxide and two moles of NADH
- b) one mole of ribulose 5-phosphate, one mole of carbon dioxide and two moles of NADP
- c) one mole of sedoheptulose 7-phosphate , one mole of carbon dioxide and two moles of NADPH
- d) one mole of ribulose 5-phosphate, one mole of carbon dioxide and two moles of NADPH
- e) one mole of fructose 6-phosphate and two moles of NADPH

33. Glycolysis:

- a) is the sole source of ATP in erythrocytes
- b) is the only physiologically important route of glucose metabolism
- c) includes steps which are thermodynamically irreversible under physiological conditions
- d) provides NADPH
- e) both a and c

34. The activity of pyruvate dehydrogenase can be increased by

- a) high levels of acetyl CoA
- b) ATP.
- c) phosphorylation.
- d) high levels of NAD+.

35. The pentose phosphate pathway serves as an important source of which of the following?

- a) NADPH
- b) ATP
- c) Ribose 5-phosphate
- d) Glucose 6-phosphate

36. About carbohydrates

- a) Amylase in saliva can break  $\alpha$ 1,6 glycosidic bonds in glycogen and starch
- b) Amylopectin in starch consists of unbranched chain of  $\alpha$  glucose units
- c) Cellulose can be digested by glucosidases found in the human digestive tract
- d) Glycogen is the storage polysaccharide in animals

37. Glycogen and starch are structurally similar in that they both

- a) have  $\beta$ (1 $\rightarrow$ 4) and  $\beta$ (1 $\rightarrow$ 6) glycosidic bonds.
- b) have only  $\alpha$ (1 $\rightarrow$ 4) glycosidic bonds.
- c) have only  $\alpha$ (1 $\rightarrow$ 6) glycosidic bonds.
- d) None of the above are correct similarities.

38. About HMP shunt

- a) Transketolase requires PLP
- b) Transaldolase catalyzes the reaction of xylulose 5 p and erythrose 4 p
- c) Generation of one molecule of seduheptulose 7 p and glyceraldehyde 3 p requires 4 nadp+
- d) Glucose 6 p DH is a mitochondrial enzyme

39. Which of the following mechanisms is not regulated in glycolysis

- a) Inactivation of pyruvate kinase when glucagons level is elevated
- b) Inhibition of glucokinase by its product
- c) Inhibition of aldolase by fructose 1,6 BP
- d) Activation of pfk by amp

40. About glucose metabolism in rbc all are correct except

- a) Deficiency of pyruvate kinase leads to hemolytic anemia
- b) The net production of atp in BPG shunt is 2
- c) Deficiency of glucose6p DH results in hemolytic anemia
- d) 2,3 bpg produced is an allosteric factor for HB binding to oxygen

41. about absorption and transport of glucose

- a) transport of glucose across cell membrane is stimulated by insulin in muscle
- b) GLUT-2 has high km for glucose to all cells
- c) phosphate esters of different hexose can easily diffuse through cell membrane
- d) GLUT-4 is specific to fructose absorption

42. pyruvate dehydrogenase requires all the following cofactors except

- a) lipoic acid
- b) NAD
- c) PLP
- d) CoA

43. about TCA cycle

- a)  $\alpha$ -ketoglutarate DH is regulated by phosphorylation dephosphorylation
- b) in one turn of the cycle, 3 dehydrogenases are operating
- c) in the liver the conversion of isocitrate to succinate produces 7 ATP molecules
- d) the complete turn of the cycle produces 15 ATP molecules

44. about glycogen metabolism which of the following statements about liver phosphorylase kinase is correct

- a) it is inactive when epinephrine is elevated
- b) it phosphorylates glycogen phosphorylase to make it inactive
- c) it catalyses a reaction that requires ATP
- d) it is not affected by cAMP

45. a bifunctional enzyme is

- a) glucose 6 phosphatase
- b) fructose 1,6 bisphosphatase
- c) debranching enzyme
- d) glycogen phosphorylase

46. hexokinase

- a) has high km for glucose
- b) has low v<sub>max</sub> for glucose
- c) is an induced enzyme
- d) absolutely specific for glucose

47. in HMP shunt TPP is required for

- a) G6PD
- b) transketolase
- c) epimerase
- d) transaldolase

48. all the following statement about HMP shunt are correct except

- a) it produces carbon dioxide
- b) it uses NADP
- c) it produces ribose 5-p
- d) it results in ATP synthesis

49. degradation of glycogen produces

- a) glucose 1-p only
- b) more glucose than glucose 1-p
- c) more glucose 1-p than glucose
- d) equal amounts of glucose and glu 1-p

50. glycogen synthase activity

- a) is increased by phosphorylation
- b) in liver is increased in the fasting state
- c) is present in liver but not in muscle
- d) is low when protein kinase A is high

51. all the following regarding glycogen metabolism are correct except

- a) glycogenesis and glycogenolysis are reciprocally controlled
- b) there is no net gain or loss of ATP molecules in glycogenesis
- c) increased insulin:glucagons ratios promotes glycogenesis
- d) type I glycogen storage disease is due to deficiency of glucose 6 phosphatase

52. about carbohydrate metabolism

- a)  $\beta$  galactosidase can be rate limiting in humans for utilization of lactose
- b) Glucose infused iv causes greater insulin release than oral administration
- c) Humans cannot digest polysaccharides that are joined by  $\beta$ 1,4 linkage
- d) Ouabain inhibits intestinal absorption of glucose

53. About carbohydrates

- a) A common cause of lactic acidosis is hypoxia
- b) Inosine is added to blood collected for prolonged storage for transfusion
- c) Citrate crosses the mitochondrial membrane and regulates the flux of glucose oxidation
- d) Glycolysis has one direct energy producing site known as SLP

54. About carbohydrates

- a) Prolactin stimulates lactose biosynthesis in the lactating mammary gland
- b) Galactosemic patients usually show lowered availability of UDP gal in liver
- c) Fructose is thought to be more lipogenic than glucose
- d) Spermatozoa use fructose as an energy source which is formed in seminal vesicles via sorbitol pathway

55. About carbohydrates

- a) MI leads to immediate release of lactate concentration in the infarcted tissue
- b) Thymine deficiency leads to accumulation of pyruvate and erythrocyte transketolase activity
- c) Decreased ratio of oxaloacetate\acetyl CoA in liver mitochondria promotes ketone body formation
- d) In eyes, lens sorbitol dehydrogenase effectively catalyses the oxidation of sorbitol and thus prevents its accumulation

56. About carbohydrates

- a) Muscle glycogen metabolism is efficiently regulated by glucagon through a cascade mechanism
- b) Glycogen has a lower energy\weight compared to TAG
- c) Addition and removal of glucose residues take place at non reducing terminals of glycogen molecules
- d) Muscle glycogen has no direct contribution to blood glucose during starvation

57. About carbohydrates

- a) Chronic metabolic acidosis leads to increased level of erythrocyte 2,3 BPG
- b) Malate aspartate shuttle serves to transfer reducing power across mitochondrial membrane in reversible manner
- c) Glutathione reductase is an antioxidant enzyme its activity is essentially dependant on NADP/NADPH +H+ ratio
- d) Glucose alanine cycle serves to translocate c skeleton of amino acids from muscle to liver during starvation

58. The direct effect of camp in the protein kinase is to

- a) Activate adenyl cyclase
- b) Dissociate regulator subunits from protein kinase
- c) Phosphorylate certain cellular proteins
- d) Release hormone from target tissue

59. Regarding glucose alanine cycle

- a) involves hepatic and renal gluconeogenesis
- b) involves hepatic gluconeogenesis and transport of muscle nitrogen to liver as alanine
- c) it involves the production of alanine for use in protein synthesis in most peripheral tissue
- d) involves transport of alanine between cytosol and mitochondria of liver

60. Regarding obese individuals with NIDDM

- a) usually show a normal GTT
- b) usually have a lower plasma level of insulin than normal individuals
- c) usually show a marked improvement in glucose tolerance if body weight is reduced to normal
- d) usually have lower plasma levels of glucagons than normal individuals

61. All the following are required for the conversion of galactose to UDP glucose except

- a) Galactokinase
- b) Uridyl transferase
- c) Phosphoglucomutase
- d) Epimerase

62. About fructose metabolism

- a) Must be isomerized to glucose
- b) Is converted to fructose 6-p by fructokinase
- c) Deficiency of aldolase b causes fructose intolerance
- d) Unlike glucose fructose cannot be metabolized to pyruvate

63. One of the following glycolytic enzymes is used in gluconeogenesis

- a) Hexokinase
- b) PFK I
- c) Aldolase
- d) Pyruvate kinase

64. Synthesis of glucose from pyruvate

- a) Involves lactate as intermediate
- b) Requires FAD
- c) Is inhibited by glucagons
- d) Requires biotin

65. In gluconeogenesis

- a) All amino acids serves as substrates
- b) All reactions of glycolysis function in reverse direction
- c) Acetyl CoA is directly involved
- d) Propionyl CoA is converted to glucose through intermediates in TCA cycle

66. About TCA cycle

- a) Inhibited by malate
- b) Each turn of the cycle produces 2 ATP molecules at the substrate level
- c) It involves only one fad dependant dehydrogenase
- d) All reactions of the cycle are irreversible

67. All the following enzymes are regulated by covalent modification except

- a) Pyruvate dehydrogenase
- b) Pyruvate kinase
- c)  $\alpha$  ketogluterate dehydrogenase
- d) Bifunctional enzyme PFK2

68. The digestion of disaccharides occurs

- a) In the gastric mucosa
- b) By the action of salivary  $\alpha$  amylase
- c) In the intestinal lumen
- d) At the brush border membrane

69. In a patient with galactosemia who is on a galactose free diet, the d-galactose required for body functions is formed by

- a) Epimerization of UDP glucose
- b) Isomerization of glucose 1-p
- c) Aldolase condensation of triose phosphates
- d) Decarboxylation of D-heptonic acid

70. All the following are rate limiting enzymes except

- a) PFK I
- b) G6PD
- c) Aldolase A
- d) Pyruvate dehydrogenase

71. 3 yr old child with mental retardation, cataract and increased blood levels of a certain sugar alcohol was placed on a milk free diet the enzyme most likely to be deficient is

- a) hexokinase
- b) galactose-1-p uridyl transferase
- c) galactokinase
- d) alcohol dehydrgenase

72. a patient with glucokinase deficiency would have

- a) total inability to metabolize glucose
- b) requirement of a carbohydrate free diet
- c) advise to replace carbohydrates by unsaturated fats
- d) excretion of most glucose from diet into urine

73. which of the following is a lysosomal storage disease

- a) von Gierkes disease
- b) Mc Ardles disease
- c) Pompes disease
- d) Hers disease

74. the synthesis of glycogen requires

- a) phosphorylase
- b) debranching enzyme
- c) ATPase
- d) glycogen synthase

75. Which of the following metabolites can NOT be a substrate for gluconeogenesis?

- a) Succinate
- b) Acetate
- c) Lactate
- d) Alanine

76. A carbohydrate having (a) beta 1,4 glycosidic linkage(s) is all except:

- a) Sucrose
- b) Lactose
- c) Cellobiose
- d) Cellulose

77. All of the following are positive effectors of gluconeogenesis EXCEPT

- a) ATP
- b) Acetyl coa
- c) Alanine
- d) Amp

78. McArdle's disease (type V glycogen storage disease) is caused by a deficiency in

- a) glucose 6-phosphatase
- b) alpha 1,6-glucosidase.
- c) glycogen synthase.
- d) glycogen phosphorylase.

79. The products of oxidation of one mole of glucose 6-phosphate through the initial portion of the pentose phosphate pathway are

- a) one mole of ribulose 5-phosphate, one mole of carbon dioxide and two moles of NADH.
- b) one mole of ribulose 5-phosphate, one mole of carbon dioxide and two moles of NADP.
- c) one mole of ribulose 5-phosphate, one mole of carbon dioxide and two moles of NADPH.
- d) one mole of fructose 6-phosphate and two moles of NADPH.

80. Cellular responses to insulin include the all of the following EXCEPT:

- a) increased acetyl CoA carboxylase.
- b) increased glycogen synthase.
- c) increased glucose-6-phosphatase.
- d) decreased pyruvate carboxylase.

81. Low carbohydrate diets are inappropriate with chronic ethanol consumption because:

- a) ethanol is a gluconeogenic substrate.
- b) ethanol metabolism interferes with gluconeogenesis.
- c) glucose is required for the oxidation of ethanol.
- d) complex carbohydrate (fiber) is required for the metabolism of ethanol.

82. The most important controlled step in the glycolytic pathway is

- a) the formation of fructose 1,6 bisphosphate.
- b) the formation of glucose-6-phosphate.
- c) the formation of fructose-6-phosphate.
- d) the formation of glyceraldehyde-3-phosphate.

83. The pentose phosphate pathway serves as a source for each of the following EXCEPT:

- a) ribose-5-phosphate
- b) NADPH
- c) ATP
- d) 6-phosphogluconic acid

84. Under anaerobic conditions, skeletal muscle tissue may continue to generate ATP from glucose metabolism (via glycolysis), resulting in the conversion of glucose to

- a) acetyl-CoA.
- b) succinate.
- c) Lactate
- d) Citrate

85. Glycogen in muscle

- a) serves as a source of fuel for ATP synthesis within that tissue.
- b) serves primarily as a buffer of blood glucose levels.
- c) serves as a source of glucose-6-phosphate which is subsequently dephosphorylated by glucose-6-phosphatase and transported out of the cell.
- d) is rapidly synthesized during fasting.

86. As blood levels of glucagon increase, there is a subsequent

- a) decrease in liver glycogenolysis.
- b) decrease in blood glucose.
- c) activation of liver adenylate cyclase.
- d) increase in fructose 2,6-bisphosphate.

87. Which of the following statements about glycogen metabolism and its control is INCORRECT?

- a) Glucagon causes an increase in the activity of liver phosphorylase and a decrease in activity of liver glycogen synthase.
- b) Glucagon stimulates the production of cAMP in the liver and is released from the pancreas in response to low blood glucose concentrations.
- c) Caffeine stimulates the release of glucose from the liver.
- d) Muscle glycogen is depleted during times when blood insulin levels are high.

88. Glucokinase, the liver enzyme, has which of the following properties:

- a) a lower  $K_m$  for glucose than hexokinase
- b) can be inhibited by glucose-6-phosphate
- c) can be easily saturated by physiologic glucose levels
- d) a higher  $K_m$  for glucose than hexokinase

89. Substrate level phosphorylation to form GTP in the tricarboxylic acid cycle is catalyzed by which of the following enzymes?

- a) succinate dehydrogenase
- b) succinate thiokinase
- c) pyruvate kinase
- d) fumarase

90. Glucokinase and hexokinase can each phosphorylate glucose to form glucose-6-phosphate. Which of the following statements concerning the properties of these two enzymes is INCORRECT?

- a) Hexokinase is inhibited by glucose-6-phosphate.
- b) Hexokinase and glucokinase have similar maximum velocities ( $V_{max}$ ).
- c) Hexokinase and glucokinase have similar  $K_m$
- d) Glucokinase is inhibited by fructose-6-phosphate.

91. NADH is produced in reactions catalyzed by the following enzymes in the tricarboxylic acid cycle EXCEPT WHICH ONE?

- a) isocitrate dehydrogenase
- b) malate dehydrogenase
- c) succinate dehydrogenase
- d) alpha-ketoglutarate dehydrogenase

92. cleavage of glucose residues from the non-reducing ends of glycogen chains

- a) glycogen phosphorylase
- b) debranching enzyme
- c) glycogen synthase
- d) phosphorylase kinase

93. inactivation of phosphorylase kinase

- a) glycogen phosphorylase
- b) phosphorylase kinase
- c) glycogen synthase
- d) phosphoprotein phosphatase

94. activation of glycogen phosphorylase

- a) glycogen phosphorylase
- b) debranching enzyme
- c) phosphorylase kinase
- d) phosphoprotein phosphatase

95. Which conditions best explain the metabolic ketoacidosis that is characteristic in the untreated insulin-dependent Diabetic?

- a) decreased triacylglycerol mobilization in adipose and decreased glucose synthesis in liver.
- b) decreased triacylglycerol mobilization in adipose and increased glucose synthesis in liver.
- c) increased triacylglycerol mobilization in adipose and decreased glucose synthesis in liver.
- d) increased triacylglycerol mobilization in adipose and increased glucose synthesis in liver.

96. Two distinct shuttle mechanisms have been defined which are capable of moving electrons from NADH in the cytosol into the mitochondrion. These two shuttles produce different amounts of ATP per pair of electrons from oxidative phosphorylation because

- a) they operate at different efficiencies depending on the substrates available.
- b) some tissues have only one of the shuttles, while other tissues may have both.
- c) the two shuttles feed electrons to different points in the electron transport chain.
- d) only some sources of NADH can feed the malate shuttle.

97. Which of the following would be expected to slow the rate of the tricarboxylic acid cycle?

- a) AMP and pyruvate
- b) ATP and NADH
- c) NAD<sup>+</sup> and ADP
- d) calcium ion

98. Which of the following is not characteristic of hypoglycemia?

- a) drowsiness due to neuroglycopenia.
- b) reduced levels of ATP in some tissues.
- c) caused by therapeutic doses of insulin.
- d) not a consequence of oral hypoglycemic agents.

99. In the Cori cycle, carbons in the form of lactate are carried by the blood to the liver and then returned to muscle tissue by the blood in the form of

- a) glucose.
- b) Pyruvate
- c) Alanine
- d) Lactate

100. The glycolytic pathway is the sole source of ATP:

- a) For a fetus in utero
- b) . in bacteria
- c) in human red blood cells
- d) under aerobic conditions.

GOOD LUCK

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