Question One:

Select the correct answer for the following statements then mark the correct letter in your bubble sheet: (50 marks, 120 min)

1. Which of the following is the major site for cholesterol synthesis? E
   a. Adrenal cortex
   b. Pancreas
   c. Skeletal muscles
   d. Thyroid gland
2. Which enzyme is termed as the rate limiting enzyme of cholesterol biosynthesis? M
   a. Thiolase
   b. HMG-CoA synthase
   c. HMG-CoA reductase
   d. Acetyl-CoA carboxylase
3. Phenylketonuria is a disorder characterized by mousy odor of child urine, which is caused by the deficiency of …….. enzyme. E
   a. Tyrosine hydroxylase
   b. Phenylalanine hydroxylase
   c. Homogentisic acid oxidase
   d. Fumarylacetoacetase
4. Premature arterial diseases are developed in patients with: E
   a. Maple syrup urine disease
   b. Tyrosinemia
   c. Cystinuria
   d. Homocystinuria
5. During the absorptive state, which of the following statements is correct? M
   a. All tissues are using glucose as an energy source
   b. The insulin:glucagon ratio is elevated
   c. Anabolic processes are favoured
   d. All of the above
6. How does the liver respond to high blood glucose level? M
   a. By increasing the phosphorylation of glucose
   b. By decreasing the phosphorylation of glucose
   c. By allowing sodium entry into the cell to counteract the high blood glucose level
   d. By releasing insulin

7. In the absorptive state, fat metabolism causes …….. in skeletal muscles. M
   a. Fatty acid release from chylomicrons by lipoprotein lipase
   b. Increase fatty acid oxidation
   c. Increase synthesis of ketone bodies
   d. Increase glycogen degradation
8. Which of the following plasma membrane receptors activates signaling pathways usually by forming molecular dimers that results in protein phosphorylation reactions upon binding of their specific ligands? M
   a. Steroid hormone intracellular receptors
   b. Receptor tyrosine kinases
   c. Ligand-gated ion channels
   d. G-protein-coupled receptors
9. Second messengers are: E
   a. Signaling molecules that bind to cell surface receptor proteins
   b. Integral proteins that bind to signaling molecules
   c. Small molecules and ions that relay signals received by cell surface receptor proteins
   d. Protein kinases
10. All of the following statement about soluble receptors are correct EXCEPT: M
    a. Hormones that diffuse across the membrane onto the cell bind to intracellular receptors.
    b. Signals do not enter the cell that must be sensed by a receptor outside to send the signal inside
    c. Soluble receptors change their confirmation and bind to specific DNA sequences in the nucleus
    d. Soluble receptors include steroid receptors and thyroid hormone receptors
11. All of the following statements about cAMP are correct EXCPT: E
    a. It is used to activate protein kinases in the signal transduction pathway
    b. It is broken down by phosphodiesterase
    c. It is a G-protein coupled receptor
    d. It is formed by adenylyl cyclase
12. Which of the following DOES NOT have antioxidant qualities? E
    a. Vitamin C
    b. Vitamin E
    c. Calcium
    d. Ubiquinone

13. The conversion of GSSG to GSH is catalyzed by …… enzyme in presence of NADPH. E
    a. Glutathione peroxidase
    b. Glutathione reductase
    c. Catalase
    d. Superoxide dismutase
14. All of the following are sources of oxygen radicals in the body EXCEPT: E
    a. Ionizing radiation
    b. Normal oxidation of reduced flavin coenzymes
    c. Dietary polyphenols
    d. Transition metal ions
15. All of the following are implicated in the development of insulin resistance EXCEPT: M
    a. Elevated levels of free fatty acids
    b. Wait gain
    c. Leptin
    d. Cholecystokinin
16. The Warburg effect means: M
    a. Increased glucose utilization without lactate production
    b. Increased lactate production without glucose utilization
    c. Increased both glucose utilization and lactate production
    d. Increased oxidative phosphorylation
17. All of the following are hallmarks of cancer EXCEPT: E
    a. Sustained angiogenesis
    b. Ability to metastasize
    c. Altered metabolism
    d. Enhancement of apoptosis
18. Which of the following are metabolic dysregulations occur during cancer development? M
    a. Oxygen consumption is increased
    b. Aerobic glycolysis is enhanced
    c. GLUT4 expression is decreased
    d. Hexokinase-2 activity is decreased
19. PKM2 is present in cancer cells in …… form. E
    a. Monomeric
    b. Dimeric
    c. Tetrameric
    d. Hexameric

20. Tumor cells are characterized by glutamine addiction to: D
    a. Replenish the Krebs cycle intermediate
    b. Increase sensitivity to growth-inhibitory signals
    c. Inhibit angiogenesis
    d. Inhibit glycolysis
21. Wear and tear theory of aging involves: D
    a. Hydrolytic reactions lead to replacement of the neutral amide group with an acidic carboxylic acid group
    b. The bond between the nucleotide base and deoxyribose moiety in DNA is resistant to hydrolysis
    c. Crosslinking between two proteins and biological macromolecules is inhibited
    d. The cumulative damage was caused by overproduction of reactive oxygen species
22. Aging-related metabolic changes include all of the following EXCEPT: M
    a. Reduction in amino acid pool
    b. Reduction in nucleic acid pool
    c. Enhancement of fatty acid oxidation
    d. Dysregulation of neural calcium homeostasis
23. The predominant lipid fraction in milk is: E
    a. Monoacylglycerols
    b. Diacylglycerols
    c. Triacylglycerols
    d. Phospholipids
24. Antioxidant capacity of milk and milk products is mainly due to presence of all of the following components EXCEPT: E
    a. Selenium
    b. Sulfur containing amino acids
    c. Flavonoids
    d. Carotenoids
25. A 20-year-old male is brought into the hospital with a history of lactic acidosis, hypoglycemia, hyperuricemia and hypertriglyceridemia. The most probable diagnosis will be: D
    a. Galactosemia
    b. Hartnup's disease
    c. Cystinuria
    d. Von Gierke's disease

26. The ring structure of cholesterol can't be metabolized to CO_2 and H_2O. The intact sterol nucleus of cholesterol is eliminated from the body by conversion to: M
    a. Bile acids
    b. Ammonia
    c. Urea
    d. Acetyl-CoA
27. Regarding feed absorptive state, which of the following glucose transporter is highly expressed in adipose tissues? E
    a. GLUT1
    b. GLUT2
    c. GLUT3
    d. GLUT4
28. Which of the following increases the strength of signal by turning one molecule original signal into many molecules of secondary signals? E
    a. Receptor
    b. Effector
    c. Amplifier
    d. Inhibitor
29. Glucagon mediates its action through: E
    a. Tyrosine kinase-coupled receptors
    b. Phospholipase C-coupled receptors
    c. G-protein-coupled receptors
    d. Ion channel-coupled receptors
30. Food compounds selectively used by host microorganisms to produce health benefits are: E
    a. Prebiotics
    b. Probiotics
    c. Casein
    d. Rennets
31. In the anaerobic glycolytic pathway one mole of glucose is metabolized to: E
    a. Two moles of lactate
    b. Two moles of oxaloacetate
    c. Two moles of acetyl Co-A
    d. Two moles of glycerol

32. Regarding glucokinase enzyme, all of the following statements are correct EXCEPT: E
    a. It is present only in the liver and pancreas
    b. It is specific to glucose
    c. It is a constitutive enzyme
    d. It converts glucose to glucose-6-phosphate
33. Which of the following co-enzymes is NOT involved in the action of pyruvate dehydrogenase complex? E
    a. TPP
    b. PLP
    c. Lipoic acid
    d. Co-enzyme A
34. Acetyl Co-A is transported from mitochondria to the cytoplasm in the form of: M
    a. Acetate
    b. Malate
    c. Pyruvate
    d. Citrate
35. In TCA cycle, GTP is synthesized in the reaction catalyzed by: M
    a. Isocitrate dehydrogenase
    b. Alpha keto glutarate dehydrogenase
    c. Succinyl Co-A synthetase
    d. Citrate synthase
36. Regarding pyruvate carboxylase enzyme, all of the following statements are correct EXCEPT: M
    a. It requires TPP as coenzyme
    b. It catalyzes synthesis of oxaloacetate from pyruvate
    c. It requires acetyl Co-A as allosteric activator
    d. It is a mitochondrial enzyme
37. Glycogenolysis in the muscle does not produce free glucose because: M
    a. Muscle lacks phosphorylase enzyme
    b. Muscle has few amount of glycogen
    c. Muscle lacks glucose-6-phosphatase
    d. Muscle glycogen is not branched
38. Glucagon stimulates glycogenolysis via: M
    a. Stimulating glucose transport
    b. Increasing level of cAMP
    c. Stimulating synthesis of UDP-glucose
    d. Stimulating synthesis of PEP carboxykinase

39. Alanine is considered a gluconeogenic precursor because it can be metabolized to: E
    a. Dihydroxyacetone phosphate
    b. Pyruvate
    c. Oxaloacetate
    d. Fumarate
40. An example of substrate level phosphorylation is the reaction catalyzed by: M
    a. Phosphofructokinase
    b. Hexokinase
    c. Glyceraldehyde-3-phosphate dehydrogenase
    d. Pyruvate kinase
41. NADPH is produced in the cells mainly from the reaction catalyzed by: M
    a. Hexokinase
    b. Glucose-6-phosphate dehydrogenase
    c. Phosphopentose isomerase
    d. Glycogen phosphorylase
42. Long chain fatty acyl Co-A is transported from the cytoplasm to inside the mitochondria by: E
    a. Malate shuttle
    b. Citrate shuttle
    c. Carnitine shuttle
    d. None of the above
43. Complete oxidation of 16 carbon saturated fatty acid yields: M
    a. 141 moles of ATP
    b. 129 moles of ATP
    c. 300 moles of ATP
    d. 160 moles of ATP
44. The following tissues can utilize ketone bodies as an alternative source of energy EXCEPT: M
    a. RBCs
    b. Brain
    c. Muscle
    d. Heart
45. The rate limiting reaction in ketogeneis is catalyzed by: M
    a. Thiolase
    b. HMG Co-A synthase
    c. HMG Co-A lyase
    d. Beta hydroxybutyrate dehydrogenase

46. Propionyl Co-A, that is produced from oxidation of odd-carbon fatty acids, can be metabolized in TCA cycle after conversion into: M
    a. Acetyl Co-A
    b. Butyryl Co-A
    c. Alpha ketoglutaryl Co-A
    d. Succinyl Co-A
47. In fatty acid synthesis, malonyl Co-A is synthesized from acetyl Co-A by: M
    a. Dehydrogenation reaction
    b. Hydration reaction
    c. Decarboxylation reaction
    d. Carboxylation reaction
48. The end product of fatty acid synthase complex is: M
    a. Palmitic acid
    b. Stearic acid
    c. Linoleic acid
    d. Phosphatidic acid
49. Ammonia is transported from extrahepatic tissues to the liver in the form of: E
    a. Glutamine
    b. Glutamate
    c. Asparagine
    d. Aspartate
50. Urea is directly produced in the reaction catalyzed by: E
    a. Arginase
    b. Carbamoyl phosphate synthase
    c. Ornithine transcarbamoylase
    d. Argininosuccinase
51. L-amino acid oxidase produces ammonia and hydrogen peroxide. The latter should be immediately metabolized by: M
    a. Arginase
    b. Catalase
    c. Glutathione
    d. Deaminase
52. Transaminases act to transfer amino group of an amino acid to: M
    a. Alpha ketoglutarate
    b. Alanine
    c. Aspartate
    d. Citrate

53. The co-enzyme necessary for the action of transaminases is: E
    a. TPP
    b. Biotin
    c. PLP
    d. Co-A
54. Serine can be synthesized from glycine in presence of: M
    a. Methylene THF
    b. Methyl THF
    c. SAM
    d. Vitamin B12
55. Biosynthesis of phosphatidylcholine from phosphatidylethanolamine requires: M
    a. SAM
    b. Methyl THF
    c. H4-Biopterin
    d. Biotin
56. During biosynthesis of cysteine, cystathionine beta synthase catalyzes condensation of: M
    a. Serine and homocysteine
    b. Glycine and homocysteine
    c. Serine and glutamate
    d. Methionine and serine
57. Phenylalanine hydroxylase catalyzes the synthesis of: M
    a. Homogentisic acid
    b. Tryptophan
    c. Tyrosine
    d. Serotonin
58. Stored fat in adipose tissue is hydrolyzed by the effect of: M
    a. Lipoprotein lipase
    b. Hormone sensitive lipase
    c. Phospholipase
    d. Fatty acyl Co-A dehydrogenase
59. Ribose-5-phosphate can be synthesized from glucose-6-phosphate through: M
    a. Glycolysis
    b. Gluconeogenesis
    c. Cori cycle
    d. PPP

60. Which of the following reactions is NOT anaplerotic reaction? D
    a. Biosynthesis of oxaloacetate from pyruvate
    b. Transamination of glutamate into alpha ketoglutarate
    c. Biosynthesis of lactate from pyruvate
    d. Biosynthesis of oxaloacetate from malate
61. Glucagon stimulates gluconeogenesis through all of the following EXCEPT: M
    a. Inducing synthesis of PEP carboxykinase
    b. Stimulating insulin secretion
    c. Decreasing level of fructose-2,6-bisphosphate
    d. Inactivation of pyruvate kinase
62. Favism is due to genetic deficiency of: M
    a. Glyceraldehyde-3-P dehydrogenase
    b. Glucose-6-phosphatase
    c. Glycogen phosphorylase
    d. Glucose-6-P dehydrogenase
63. Ketogenesis occurs in: E
    a. Liver
    b. Muscle
    c. RBCs
    d. All of the above
64. Which of the following enzymes catalyze reactions that DO NOT consume ATP? M
    a. Carbamoyl phosphate synthase I
    b. Fatty acyl Co-A synthetase
    c. Pyruvate carboxylase
    d. Aspartate transaminase
65. Which of the following enzymes catalyze reversible reaction? D
    a. Malate dehydrogenase
    b. Pyruvate dehydrogenase
    c. Isocitrate dehydrogenase
    d. Fatty acyl Co-A dehydrogenase
66. Hyperammonemia causes neurotoxicity due to: M
    a. Slowing down TCA cycle & decreased ATP level
    b. Enhanced synthesis of glutamine
    c. Consuming glutamate
    d. All of the above
67. A pear-shaped female is at higher health risk than apple-shaped female. E
    a. True b- False

Best Wishes