1. Vitamins can act as coenzymes that participate in catalysis by providing functional groups. Therefore, vitamin deficiencies reflect the loss of specific enzyme activities that depend on those coenzymes. Coenzymes are best described by which one of the following
-In humans, they are always synthesized from vitamins.
-They are proteins.
-They participate in only one reaction, like enzymes.
+They are complex, nonprotein organic molecules.
-They are all carbohydrates.

2. In non-competitive enzyme action:
-Vmax is increased
-Apparent Km is increased
-Apparent Km is decreased
+Concentration of active enzyme molecule is reduced
-None of the above

3. An allosteric enzyme influences the enzymes activity by:
-Competing for the catalytic site with the substrate
-Changing the specificity of the enzyme for the substrate
+Changing the conformation of the enzyme binding to a site other than catalytic site
-Changing the nature of the products formed
-All of the above

4. A competitive inhibitor of an enzyme has which of the following properties
-It is frequently a feedback inhibitor
-It becomes covalently attached to an enzyme
-It decreases the Vmax
+It interferes with substrate binding to the enzyme
-It causes irreversible inactivation of the enzyme

5. When (S) is equal to Km, which of the following conditions exist
+Half the enzyme molecules are bound to substrate
-The velocity of the reaction is equal to Vmax
-The velocity of the reaction is independent of substrate concentration
-Enzyme is completely saturated with substrate
-The reaction has reached equilibrium

6. An enzyme that catalyses the coversion of an aldose sugar to a ketose sugar would be classified as one of the:
-Transferases
+Isomerases
-Oxidoreductases
-Hydrolases
-Lyases

7. In which of the following types of enzyme water may be added to a C=C double bond without breaking the bond
-Hydrolase
+Hydratase
-Hydroxylase
-Esterase
-Oxygenase

8. Kinases are a class of enzymes that incorporate a phosphate onto their substrates. The catalytic activity of kinases classifies them as members of which of the following enzyme families
-hydrolases
-isomerases
-ligases
-oxidoreductases
+transferases

9. GLUT4 is the glucose transporter involved in insulin-stimulated glucose uptake into adipose tissue and skeletal muscle. The mechanism of glucose transport by GLUT4 is of which of the following types
-active transporter
+facilitated diffusion
-gated ion channel
-simple diffusion

10. Cardiotonic steroids, produced by the adrenal glands, heart tissue, and hypothalamus are specific inhibitors of which of the following
-aquaporins
-F-type ATPases
+Na/K_ATPases
-P-type ATPases
-SLC type transporters

11. A patient, Mr. P., has just suffered a heart attack. As a consequence, his heart will display which one of the following changes
-Increased intracellular O2 concentration
-Increased intracellular ATP concentration
+Increased intracellular H concentration
-Decreased intracellular Ca2 concentration
-Decreased intracellular Na concentration

12. When athletes expend vast amounts of energy, they are sometimes seen on the sidelines using supplemental oxygen. More than 90% of the O2 we breathe is used for the generation of which one of the following
+ATP
-ADP
-NAD
-FAD
-Acetyl-CoA

13. All physiologic processes in living cells require energy transformation. Which one of the following would be considered biochemical work using the high-energy phosphate bonds of ATP
-Contracting muscle fibers
-Developing a Na gradient across a membrane
-Transporting compounds against a concentration gradient
+Converting toxic compounds to nontoxic compounds in the liver
-Undergoing catabolic pathways

14. A patient with alcoholism developed pancreatitis that affected his exocrine pancreatic function. He exhibited discomfort after eating a highcarbohydrate meal. The patient most likely had a reduced ability to digest which one of the following
+Starch
-Lactose
-Fiber
-Sucrose
-Maltose

15. A man with type 1 diabetes neglects to take his insulin injections while on a weekend vacation. Cells found within which tissue will be most greatly affected by this mistake
-Brain
-Liver
+Muscle
-Red blood cells
-Pancreas

16. After digestion of a piece of cake that contains flour, milk, and sucrose as its primary ingredients, the major carbohydrate products that enter the blood are which of the following

-Glucose
-Fructose and galactose
-Galactose and glucose
-Fructose and glucose
+Glucose, galactose, and fructose

17. A pyruvate carboxylase deficiency will lead to lactic acidemia because of which one of the following
+An accumulation of acetyl-CoA in the mitochondria
-Allosteric activation of lactate dehydrogenase
-An accumulation of NADH in the mitochondrial matrix
-Allosteric activation of the PDC
-An accumulation of ATP in the matrix

18. A patient has large deposits of liver glycogen, which, after an overnight fast, had shorter-than-normal branches. This abnormality could be caused by a defective form of which one of the following proteins or activities
-Glycogen phosphorylase
-Glucagon receptor
-Glycogenin
+Amylo-1,6-glucosidase
-Amylo-4,6-transferase

19. The nitrogen donor for the formation of amino sugars is which one of the following
-Ammonia
-Asparagine
+Glutamine
-Adenine
-Dolichol

20. A common intermediate in the conversion of glycerol and lactate to glucose is which one of the following
-Pyruvate
-OAA
-Malate
+Glucose 6-phosphate
-PEP

21. Which one of the following is most likely to occur in a normal individual after ingesting a high-carbohydrate meal
-Only insulin levels decrease.
+Only insulin levels increase.
-Only glucagon levels increase.
-Both insulin and glucagon levels decrease.
-Both insulin and glucagon levels increase.

22. In the production of ATP during glucose metabolism in erythrocytes, which of the following is the immediate donor of the phosphoryl group to ADP
-2,3-bisphosphoglycerate
-fructose 1,6-bisphosphate
-fructose 2,6-bisphosphate
-glyceraldehyde 3-phosphate
+phosphoenolpyruvate

23. The purpose of the Cori cycle is to shift the metabolic burden in which of the following directions
-brain to liver
-cardiac to skeletal muscle
-liver to brain
-liver to muscle
+muscle to liver

24. Which of the following vitamins is needed for the synthesis of a cofactor required for the conversion of succinate to fumarate
-lipoic acid
-niacin
-pantothenic acid
+riboflavin
-thiamine

25. In the TCA cycle, GTP is produced via a process referred to as substrate-level phosphorylation. Which of the following enzymes is involved in this process of formation of GTP from GDP
-citrate synthase
-isocitrate dehydrogenase
-malate dehydrogenase
+succinate-CoA synthetase
-succinate dehydrogenase

26. Reduced ubiquinone, generated during the oxidation of NADH, passes its electrons to which of the following
-ATP synthase
-cytochrome c oxidase (complex IV)
+cytochrome b
-cytochrome c
-molecular oxygen

27. Which of the following components of mitochondrial electron transport can act as 1-electron or 2-electron carriers
+coenzyme Q and flavins
-cytochrome c, coenzyme Q, and flavins
-NADH, non-heme iron, cytochrome c, coenzyme Q, and flavins
-non-heme iron, cytochrome c, coenzyme Q, and flavins

28. Which of the following is the most likely mechanism of action of a pharmacological agent that prevents ATP generation in isolated mitochondria
-activation of cytochrome c
-decrease of NADH generation by NADH dehydrogenase
+disruption of pH gradient across mitochondrial membrane
-increase of transport of pyruvate through the mitochondrial membrane
-inhibition of glyceraldehydes-3-phosphate dehydrogenase

29.According to the chemiosmotic theory of how oxidation and phosphorylation are coupled, which of the following processes produces the chemical gradient that drives the generation of ATP from ADP
-electron transport causes H to penetrate the inner mitochondrial membrane
+electron transport ejects H into the intermembrane space
-FADH2 is regenerated from FAD
-NADH is regenerated from NAD
-osmotic forces cause H to bind with FAD in the mitochondrial matrix

30. A patient has been taking an experimental drug to reduce weight. The drug leads to significant steatorrhea and some night-blindness. A potential target of this drug is which one of the following
-LPL activity
-Albumin synthesis
-Glucagon release
-Insulin release
+Cholecystokinin release

31.The absence of which hormone listed would result in an inability to raise the pH of the partially digested food leaving the stomach, leading to an inability to digest lipids in the intestine
-Pancreatic lipase
-Intestinal cholecystokinin
-Pancreatic cholecystokinin

+Intestinal secretin
-Pancreatic secretin

32. A patient with diabetes in ketoacidosis has a specific odor to the breath. Which one of the following compounds is responsible for this odor
-Acetoacetate
-OI-Hydroxybutyrate
+Acetone
-Acetyl-CoA
-CO2

33. In humans, prostaglandins are derived primarily from which one of the following
-Glucose
-Acetyl-CoA
+Arachidonic acid
-Oleic acid
-Leukotrienes

34. Dietary fatty acids are precursors for sphingolipids. Of the following, which one is formed from sphingolipids
-Lung surfactant
+Myelin sheath
-Bile
-Arachidonic acid
-Blood lipoproteins

35.Low-dose aspirin is used as a prevention of platelet aggregation and heart attacks, whereas high-dose aspirin is used as an antiinflammatory drug. Low-dose aspirin is used to block the formation of which eicosanoid
-Prostaglandins
+Thromboxanes
-Leukotrienes
-Lysoxins
-Epoxides

36. Which of the following compounds directly inhibits the expression of the HMGCoA reductase gene
+cholesterol
-HMG-CoA
-isopentenyl pyrophosphate
-lanosterol
-squalene

37. A 23-year-old woman presents with low red blood cell count, corneal opacities, and renal insufficiency. She is diagnosed with lecithin:cholesterol acyltransferase (LCAT) ratio deficiency. In which of the following reactions LCAT is involved
+converting cholesterol to cholesterol esters
-hydrolysis of HDL
-promoting uptake of HDL into liver cells
-transfer of cholesterol esters from HDL to VLDL
-uptake of cholesterol from liver cells

38. Laboratory results for a patient with uncontrolled type 1 diabetes reveal hyperglycemia (634 mg/dL) and hypertriglyceridemia (498 mg/dL). Which of the following represents the most likely cause of the hypertriglyceridemia in this patient
-absence of hormone-sensitive lipase
+decreased lipoprotein lipase activity
-deficiency in apoprotein C-II
-deficiency in LDL receptors
-increased hepatic triglyceride synthesis

39. A 23-year-old man is found to be incapable of producing chylomicrons. Which of the following is the most likely consequence of this disorder
-fasting hyperglycemia
+impaired absorption of dietary lipids
-increased risk of hypertriglyceridemia
-increased risk of lactic acidosis
-increased serum urea nitrogen concentration

40. Which one of the following is a major difference between patients with diabetes mellitus types 1 and 2
-In type 1, insulin levels are very low and insulin resistance is high.
-In type 2, insulin levels are very low and insulin resistance is high.
-In both types, the patient is usually at or below ideal body weight.
+In type 1, C-peptide levels are very low.
-In type 1, the patient is usually overweight.

41. A person is training for a half-marathon. After running 5 miles, which one of the following is providing most of the products for ATP generation in the muscles
-Muscle glycogen
-Liver glycogen
-Blood glucose
-Ketone bodies
+Fatty acids

42. A person with phenylketonuria cannot convert:
+phenylalanine to tyrosine
-phenylalanine to isoleucine
-phenol into ketones
-phenylalanine to lysine.

Oxidative deamination is the conversion of an amino:
43. -group from an amino acid to a keto acid
-acid to a carboxylic acid plus ammonia
+acid to a keto acid plus ammonia
-group from an amino acid to a carboxylic acid.

44. Which one of the following is characteristic of untreated diabetes regardless of the type
+Hyperglycemia
-Ketoacidosis
-Low levels of hemoglobin HbA1c
-Normal levels of C-peptide
-Obesity

45. Which of these terms best describes the interactions of insulin and glucagon
-Synergistic
-Permissive
+Antagonistic
-Cooperative

46. This is known as a pre-cursor to T3
+Thyroxine (T4)
-Calcitonin
-Parathyroid hormone (PTH)
-Melatonin

47. Altered plasma renin levels can occur in both normal and pathologic conditions. Which of the following states is associated with a decrease in plasma renin levels
-heart failure
+primary aldosteronism

-renal artery stenosis
-salt restriction
-upright posture

48. Parathyroid hormone regulates the concentration of the most potent vitamin D metabolite by increasing which of the following conversion
-cholecalciferol to 24,25-dihydroxycholecalciferol
-cholecalciferol to 25-hydroxycholecalciferol
-7-dehydrocholesterol to cholecalciferol
-ergosterol to ergocalciferol
+25-hydroxycholecalciferol to 1,25-dihydroxycholecalciferol

49. Metabolic acidosis occurs in all the following conditions except:
+Vomiting
-Uncontrolled diabetes mellitus
-Starvation
-Severe exercises

50. A recent surgery patient receiving warfarin therapy was found to be bleeding internally. The clotting process is impaired in this patient primarily because of which one of the following
-Inability of the liver to synthesize clotting factors
-Specific inhibition of factor XIII activation
+Inability to form clotting factor complexes on membranes
-Reduction of plasma calcium levels
-Enhancement of protein C activity