



*Multiple Choice Questions*  
**MEDICAL CHEMISTRY**  
(Problem based questions)



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*Department of Medical Chemistry introduces this activity on multiple choice questions-Problems based in Medical Chemistry as a part of its commitment to continuous education and learning. Medical students are encouraged to read this short book to improve their knowledge and direct their reading for written examinations. The range of subjects included in this short book is based on the content outline of what is thought in medical schools today. It covers topics that have formed the core of such courses that are still valid today.*

**DIRECTIONS:** Each of the questions or incomplete statements below is followed by four-five suggested answers or completions. Choose the most appropriate single answer in each case

### Enzymes

**Q1) A 54 –year-old male was rushed to emergency when he collapsed in the middle of a business meeting. Examination revealed excessive sweating and high blood pressure. ECG chest was conclusive of Acute Myocardial Infarction. Which biochemical investigation out of the following would be of no help in the confirmation of diagnosis?**

- A. Cardiac troponins
- B. Serum myoglobin
- C. Lactate dehydrogenase
- D. Creatine Phospho kinase-MB(CPK-MB)

**Q2) A 42-year-old obese female presented to the emergency center with complaints of worsening nausea, vomiting, and abdominal pain. Her pain was located in the mid epigastric area and right upper quadrant. Blood biochemistry revealed high serum amylase level. What is the probable diagnosis for this patient?**

- A. Viral hepatitis
- B. Acute pancreatitis
- C. Renal colic
- D. Acute gastritis

### KEY TO ANSWERS

Question	Answer	Question	Answer	Question	Answer	Question	Answer
1	C	24	B	47	E	70	C
2	B	25	A	48	C	71	E
3	C	26	A	49	B	72	B
4	B	27	E	50	A	73	C
5	A	28	C	51	B	74	A
6	B	29	C	52	C	75	D
7	A	30	A	53	B	76	B
8	C	31	D	54	C	77	B
9	C	32	A	55	C	78	C
10	B	33	E	56	B	79	D
11	C	34	D	57	C	80	D
12	A	35	D	58	C		
13	E	36	A	59	B		
14	A	37	B	60	B		
15	B	38	E	61	A		
16	A	39	D	62	D		
17	A	40	C	63	B		
18	D	41	B	64	C		
19	B	42	D	65	D		
20	D	43	A	66	D		
21	C	44	D	67	C		
22	D	45	C	68	C		
23	B	46	C	69	B		

### References

1. Textbook of Biochemistry for Medical Students, 7<sup>th</sup> Edition
2. Multiple Choice Questions, Biochemistry for Medics-Lecture Notes
3. Multiple Choice Questions on Clinical Chemistry in Diagnosis and Treatment.

- D. 11 hydroxylase deficiency
- E. 17 hydroxylase deficiency

**Q79) A physician want top order thyroid function tests on an acutely ill, hospitalized patient suspected of being hypothyroid. The best advice would be:**

- A. Order a 3<sup>rd</sup> generation TSH test
- B. Order measurements of free T3
- C. Order a TRH challenge test
- D. Wait until the illness is over before performing the thyroid investigation
- E. Immediately treat with thyroid replacement therapy

**Q80) A comatose 27-year-old woman is brought to the emergency room by paramedics, and the strong odor of bitter almond is present. The differential diagnosis must include the possibility of poisoning by**

- A. ethylene glycol
- B. carbon tetrachloride
- C. carbon monoxide
- D. cyanide
- E. arsenic

**Q3) A 60-year-old chronic alcoholic was brought to the hospital with complaints of protuberant abdomen (ascites) and edema feet. He also had history of hemorrhages. Blood biochemistry revealed- High serum transaminases, low serum total proteins, Albumin and a prolonged prothrombin time. Urine analysis was normal. What could be the possible diagnosis?**

- A. Renal failure
- B. Protein malnutrition
- C. Cirrhosis of liver
- D. Heart failure

**Q4) A 52-year-old man had a myocardial infarction 8 hour ago. Which of the following pairs of plasma enzyme activity measurements is most likely to be abnormal?**

- A. Creatine kinase-MB and lactate dehydrogenase
- B. Creatine kinase-MB and aspartate aminotransferase
- C. Aspartate aminotransferase and lactate dehydrogenase
- D. Aspartate aminotransferase and alanine aminotransferase

**Q5) One out of the following enzymes has absolute specificity for its substrate, choose the correct option-**

- A. Urease
- B. Carboxy peptidase
- C. Pancreatic lipase
- D. Lipoprotein lipase

**Vitamins**

**Q6) A 23-year-old male, golden gloves boxing contender presents with metabolic disorder. He describes his training regimen that involves consuming a dozen raw eggs a day for a protein. Raw eggs contain a protein called Avidin; with an extremely high affinity for a cofactor, required by Propionyl CoA carboxylase, Acetyl CoA carboxylase and pyruvate carboxylase. The patient is deficient in which of the following cofactors?**

- A. Cobalamine
- B. Biotin
- C. Folic acid
- D. Pyridoxal phosphate
- E. Thiamin pyrophosphate

**Q7) A 20-year-old female, a known alcoholic has been brought to the emergency department with respiratory distress. Bilateral crepitations are felt in the lungs, neck veins are engorged and x-ray chest shows dilated heart. She has been diagnosed with 'Cardiac Beri-Beri. Which of the following reactions might have been affected?**

- A. Pyruvate to Acetyl CoA
- B. Pyruvate to Oxaloacetate
- C. Pyruvate to lactate
- D. Pyruvate to Alanine
- E. Pyruvate to Malic acid

**Q76) Serum glucose of 1083 mg/dl is most suggestive of which of the following conditions in a 65 year old female:**

- A. Insulin resistance
- B. Hyperosmolar coma
- C. Hyperlipidemia
- D. Ketoacidosis
- E. Overeating

**Q77) A person having an abnormally low serum cortisol baseline level is given ACTH. A subsequent serum cortisol measurement taken 1 hour after ACTH shows no change in the serum cortisol level. The most probable diagnosis of the patient**

- A. Cushing's syndrome
- B. Addison's disease
- C. Adrenal tumor
- D. Hypopituitarism
- E. Hypoactive hypothalamus

**Q78) A new born female child is born with ambiguous genitalia and develops hyponatremia, hyperkalemia, and hypotension shortly after birth. Which of the following is (are) the most likely cause for her problem?**

- A. autoimmune destruction of the adrenal gland
- B. infarction of the adrenal gland
- C. 21 hydroxylase deficiency

**Q73) In the male, increased FSH and LH and decreased testosterone is most likely associated with:**

- A. primary hypergonadism
- B. Secondary hypergonadism
- C. Primary hypogonadism
- D. Secondary hypogonadism
- E. Normal function

**Q74) A diagnosis of hemolytic anemia in an 11-year-old boy would be supported by the following findings:**

- A. Urinary urobilinogen excretion increased
- B. Increased plasma ALP
- C. Increased plasma ALT
- D. Increased plasma haptoglobin
- E. Hypoalbuminemia

**Q75) A45-year-old patient presents with hypertension, central obesity, abdominal striae, muscle weakness, and moon face. Which of the following test would be? most useful perform first?**

- A. ACTH
- B. Aldosterone
- C. Random serum cortisol
- D. 1 mg overnight dexamethasone suppression test
- E. CRH stimulation test

**Q8) A bone marrow aspirate of a strictly vegetarian female, confirms the suspicion that she has a megaloblastic anemia because it showed a greater than normal number of red and white blood cell precursors, most of which were larger than normal. What is the cause of megaloblastic anemia in this patient?**

- A. Vitamin C deficiency
- B. Folate toxicity
- C. Vitamin B12 deficiency
- D. B6-P deficiency
- E. Vitamin K toxicity

**Q9) A45-year-old female presents to her primary care doctor with fatigue and tingling/numbness in her extremities (bilateral). Examination reveals a beefy red and fissured tongue. Further evaluation reveals a low Glutathione reductase activity in the red blood cells. Which of the following vitamin deficiencies could have caused her symptoms?**

- A. Vitamin C deficiency
- B. Niacin deficiency
- C. Vitamin B2 deficiency
- D. B6-P deficiency
- E. Biotin deficiency

**Q10) A 12-year-old boy develops convulsions. After running an encephalogram (EEG), a neurologist determines that he has epilepsy. He is prescribed with Benzodiazepine which promotes the activity of Gamma-amino butyric acid (GABA); GABA is derived from glutamic acid via which of the following biochemical reactions?**

- A. Deamination
- B. Decarboxylation
- C. Transamination
- D. Carboxylation
- E. Hydroxylation

**Q11) A 3-year-old girl has been brought for consultation. She is well below the 5<sup>th</sup> percentile for both height and weight with multiple rachitic deformities of the skeleton to include severe bowing of the tibiae bilaterally, pigeon chest and thickened/widened wrists bilaterally. Which of the following vitamins can be recommended as a part of treatment?**

- A. Biotin
- B. Folic acid
- C. Vitamin D
- D. Pyridoxal phosphate
- E. TPP

### **Special Topics**

**Q70) A three year old boy was brought unconscious into emergency room. Blood gases were performed PH 7.26, PCO<sub>2</sub> 54 mmHg, HCO<sub>3</sub> 38 mmol/l, Base excess +14 mmol/l ,this patient demonstrates:**

- A. Metabolic alkalosis
- B. Metabolic acidosis
- C. Respiratory acidosis
- D. Respiratory alkalosis
- E. Compensated metabolic acidosis

**Q71) A patient's blood urea is 30 mg/dl and his creatinine is 5.0 mg/dl.**

**What conclusion would you draw from these results?**

- A. Patient is normal
- B. Patient is in early stage of renal failure
- C. Patient protein intake is quite low
- D. Patient has suffered muscle deterioration
- E. One of the values is in error

**Q72) Liver function tests can vary depending on a number of factors, but which of the following would be LAST likely to occur after obstruction of the common bile duct?**

- A. Elevation of serum conjugated bilirubin
- B. Elevation of serum unconjugated bilirubin
- C. Elevation of serum alkaline phosphatase
- D. Appearance of bilirubin in urine
- E. Decrease of urine urobilinogen

- C. Competitively inhibit the metabolism of methanol
- D. Promote the excretion of metabolite of methanol
- E. All of the above

**Q68) In physiological jaundice of new-born, due to less availability of substrate and immature enzyme system, there is an impaired formation of soluble, non-toxic form of bilirubin which is:**

- A. Bilirubin sulphate
- B. Bilirubin phosphate
- C. Bilirubin diglucuronate
- D. Bilirubin acetate
- E. Methylated Bilirubin

**Q69) In phenylketonuria (a congenital disorder of phenylalanine metabolism that occurs due to deficiency of phenylalanine hydroxylase), there is impaired conversion of phenylalanine to tyrosine. The excess phenylalanine is detoxified and excreted in urine. Which of the following conjugating agents is used for detoxification of phenylalanine?**

- A. Glutathione
- B. Glutamine
- C. S-Adenosyl Methionine
- D. Active sulfate(PAPS)
- E. D-Glucuronic acid

**Q12) A2- year-old child presented with chronic cough and Bronchitis, growth failure and passage of light-colored, foul-smelling stools. Mother of the child reported that the child was finding it difficult to locate things in the dim light and during night-time. Which of the following vitamins might be deficient in this child?**

- A. Vitamin A
- B. Vitamin D
- C. Vitamin C
- D. Vitamin E
- E. Vitamin K

**Q13) A term infant is born and does well with breast-feeding. Two days later, the mother calls frantically because baby is bleeding from the umbilical cord and nostrils. Which of the following vitamins might be deficient in this baby?**

- A. Vitamin A
- B. Vitamin D
- C. Vitamin C
- D. Vitamin E
- E. Vitamin K

**Q14) A 45-year-old male has been brought to the emergency department after a family member found him extremely confused and disoriented. He has an unsteady gait and strange irregular eye movements. Upon extensive work up, he has been diagnosed with Wernicke-Korsakoff syndrome. Which of the following vitamins might be deficient?**

- A. TPP
- B. Biotin
- C. Folic acid
- D. Pyridoxal phosphate
- E. Niacin

### **Carbohydrate Metabolism**

**Q15) A 30-year-old man has been fasting for religious reason for several days. His brain has reduced its need for glucose by using which of the following substances as an alternate source of energy?**

- A. Fatty acids
- B. Beta hydroxy butyrate
- C. Glycerol
- D. Beta carotene
- E. Alanine

**Q16) A 7-year-old girl is brought to emergency department by her parents with complaints of severe polyuria and polydipsia. Laboratory examination reveals ketones in the urine. Which of the following is the most likely source of ketones?**

- D. Increased gluconeogenesis
- E. Decreased liver glycogen store

**Q66) A 75-year-old woman with osteoporosis complains of back pain. A magnetic resonance imaging (MRI) scan for her back confirms a compressing fracture of the L3 vertebra. The attending physician begins treating the patient with morphine for pain control. Morphine is an analgesic that works similarly to which of the following endogenously produced substances?**

- A. ACTH
- B. POMC
- C. MSH
- D. Endorphin
- E. Lipotropin

### **Detoxification**

**Q67) A 3-year-old girl was brought into the Emergency Room. She was cold and clammy and was breathing rapidly. She was obviously confused and lethargic. Her mother indicated that she had accidentally ingested automobile antifreeze while playing in the garage. Following gastrointestinal lavage and activated charcoal administration, a nasogastric tube for ethanol was administered. How will ethanol help in relieving the symptoms?**

- A. Conjugate with methanol to form a soluble compound
- B. Induce the alcohol dehydrogenase enzyme

- A. Converts xanthine to uric acid
- B. Converts ribonucleotides to deoxy ribonucleotides
- C. Degrades guanine to xanthine
- D. Degrades AMP to IMP
- E. Converts PRPP to phosphoribosylamine

**Q64) A 58-year-old man is awakened by throbbing aching in his great toe. He had a similar attack earlier also, after indulging in a rich meal. On examination, he is noted to have an angry inflamed great toe and several nodules on the antihelix of his ear. Inhibition of which of the following enzymes might prevent the occurrence of such symptoms?**

- A. Amido transferase
- B. PRPP synthetase
- C. Xanthine oxidase
- D. Orotate phosphoribosyl transferase
- E. Carbamoyl phosphate synthetase 11

### Hormones

**Q65) A 23-year-old woman has been referred from an endocrinologist for weight gain especially around the waist. She also has striae over the abdomen and a rounded appearance to her face. She is found to have Cushing disease. Which of the following is found in this patient?**

- A. Decreased absorption of glucose from intestine
- B. Decreased lipolysis
- C. Increased protein synthesis

- A. Fatty acid breakdown
- B. Protein break down
- C. Glycogenolysis
- D. Gluconeogenesis
- E. Side chain of cholesterol

**Q17) A breast-fed infant began to vomit frequently and lose weight. Several days later she developed jaundice, hepatomegaly and bilateral cataract. What is the possible cause for these symptoms?**

- A. Galactosemia
- B. Von-Gierke's disease
- C. Type 1 diabetes Mellitus
- D. Hereditary Fructose intolerance
- E. Gaucher disease

**Q18) The major metabolic product produced under normal circumstances by erythrocytes and by muscle cells during intense exercise is recycled through liver in the Cori cycle. The metabolite is-**

- A. Oxaloacetate
- B. Alanine
- C. Glycerol
- D. Lactate
- E. NADH

**Q19) A 3-month-old infant presents with hepatosplenomegaly and failure to thrive. A liver biopsy reveals glycogen with an abnormal, amylopectin like structure with long outer chains and missing branches. Which of the following enzymes would most likely be deficient?**

- A. Alpha Amylase
- B. Branching enzyme
- C. Debranching enzyme
- D. Glycogen phosphorylase
- E. Glucose-6-phosphatase

**Q20) Prior to a race, many marathon runners will try to increase their glycogen concentrations by loading up with foods with high starch content, such as pasta, Alpha amylase secreted by the pancreas will digest the starch into which of the following major products?**

- A. Amylose, amylopectin, and maltose
- B. Glucose, galactose, and fructose
- C. Glucose, sucrose, and maltotriose
- D. Limit dextrin, maltose, and maltotriose
- E. Maltose, glucose, and fructose

**Q21) Which of the following substances CANNOT contribute to net Gluconeogenesis in mammalian liver?**

- A. Alanine
- B. Glutamate
- C. Palmitate

**Q61) The diet of a child suffering from Maple syrup disease (an amino acid disorder), should be low, in which out of the following amino acids content?**

- A. Branched chain amino acids
- B. Phenylalanine
- C. Methionine
- D. Tryptophan
- E. Histidine

### **Nucleotides Metabolism**

**Q62) A 7-year-old boy suffers from mental retardation and self-mutilation and has increased levels of serum uric acid. These symptoms are characteristics of Lesch Nyhan syndrome, which is due to defective-**

- A. Salvage pathway for pyrimidine biosynthesis
- B. Denovo synthesis of pyrimidines
- C. Xanthine oxidase
- D. HGPRT (Hypoxanthine Guanine Phospho Ribosyle Transferase)
- E. Formyl transferase

**Q63) A physician evaluates a 32-year-old patient for fatigue. The patient is found to have an elevated white blood cell count (WBC) and an enlarged spleen. A referral to an oncologist results in a diagnosis of Chronic Myelogenous Leukemia (CML). Treatment with hydroxyurea, a ribonucleotide reductase inhibitor is begun. The normal functioning of this enzyme is to do which of the followings?**

**Q58) In a new born presenting with refusal to feeds and irritability, a deficiency of Cystathionine-B-synthase has been diagnosed, which of the following compounds is expected to be elevated in blood?**

- A. Serine
- B. Glutamate
- C. Homocysteine
- D. Valine
- E. Threonine

**Q59) Histamine, a chemical mediator of allergies and anaphylaxis, is synthesized from amino acid Histidine by which of the following processes?**

- A. Deamination
- B. Decarboxylation
- C. Transamination
- D. Dehydration
- E. Hydroxylation

**Q60) The synthesis of all of the following compounds except one is deficient in a patient suffering from phenylketonuria-**

- A. Melanin
- B. Melatonin
- C. Catecholamines
- D. Thyroid Hormone

- D. Pyruvate
- E. Odd chain fatty acid

**Q22) Which of the following complications is less likely to occur in type 2 diabetics, as opposed to type 1 diabetics?**

- A. Retinopathy
- B. Weight gain
- C. Cardiovascular disease
- D. Hypoglycemic coma
- E. Non ketotic hyperosmolar coma

**Q23) A30-year-old male presents with severe muscle cramps. He is found to have muscle glycogen phosphorylase deficiency (McArdle's disease < Glycogen storage type 5). Glycogen phosphorylase degrades glycogen to produce-**

- A. Glucose
- B. Glucose-1-P
- C. Glucose-6-P
- D. UDP Glucose
- E. Glycogen primer

**Q24) A15-year-old type 1 diabetic faints after injecting himself with insulin. He is administered Glucagon and rapidly recovers consciousness. Glucagon induces activity of:**

- A. Glycogen synthase
- B. Glycogen phosphorylase

- C. Glucokinase
- D. Hexokinase
- E. UDP Glucose phosphorylase

**Q25) A 30-year-old presents with intractable vomiting and inability to eat or drink for the past 3 days. His blood glucose level is normal. Which of the following is most important for maintenance of blood glucose?**

- A. Liver
- B. Heart
- C. Skeletal muscle
- D. Lysosome
- E. Spleen

**Q26) A 15-year-old male presents with increased thirst, hunger, urination, and weight loss. His fasting blood glucose level is 400 mg/dl and is diagnosed with type 1 diabetes mellitus. What is the reason for the patient's inability to maintain a normal blood glucose level?**

- A. Decreased uptake of glucose by peripheral cells
- B. Abnormal response to glucagon
- C. Decreased glucagon to insulin ratio
- D. Decreased glucose output by the liver
- E. Increased ketone body production

- A. DOPA
- B. Glutamine
- C. Tyrosine
- D. Tryptophan
- E. Threonine

**Q56) A 59-year-old woman develops gait and a pin-rolling tremor. She is referred to a neurologist for evaluation. After a thorough workup, a diagnosis of Parkinson disease is made and the patient is placed on Mono amine oxidase inhibitor. The drug in this case, is given to decrease the degradation of which of the followings?**

- A. Serotonin
- B. Dopamine
- C. Nicotinamide
- D. Melatonin
- E. Nitric oxide

**Q57) A 55-year-old man suffers from cirrhosis of liver. Toxins such ammonia are not properly metabolized by the liver and can damage brain. Which of the following compounds is expected to be highest concentration in brain as a result of detoxification of ammonia?**

- A. Alpha keto glutarate
- B. Glutamate
- C. Glutamine
- D. GABA
- E. Asparagine

**Q53) A child presented with increased frequency of urination, photophobia and impairment of vision. Which out of the following defects could be responsible for the said symptoms?**

- A. Tyrosinosis
- B. Cystinosis
- C. Alkaptonuria
- D. Albinism
- E. All of the above

**Q54) A 63-year-old woman reports a long history of joint pains. Her fingers are severely deformed secondary to rheumatoid arthritis. Upon visiting a rheumatologist, she is started on methotrexate. The drug inhibits which of the following conversions?**

- A. Dopamine to norepinephrine
- B. Tyrosine to DOPA
- C. Dihydrofolate to tetrahydrofolate
- D. Phenyl alanine to Tyrosine
- E. N-Acetyl serotonin to melatonin

**Q55) A 40-year-old woman complains of decreased energy, significant weight gain and cold intolerance. She is seen by her family physician, who has diagnosed her to be having hypothyroidism (low level of thyroid hormone). Which of the following is a precursor for thyroid hormone?**

**Q27) The main function of the pentose phosphate pathway is to:**

- A. Give the cell an alternative pathway should glycolysis fail
- B. Provide a mechanism for the utilization of the carbon skeleton of excess amino acids
- C. Supply energy
- D. Supply NADH
- E. Supply Pentose and NADPH

**Q28) A 19-year-old, African-American male military recruit is about to be sent to Iraq on his assignment. In preparation for his tour duty, he is given a prophylactic dose of primaquine to prevent malaria; several days after he develops fatigue and hemolytic anemia. Which of the following enzymes is likely deficient?**

- A. Fructokinase
- B. Aldolase B
- C. Glucose-6-P dehydrogenase
- D. Glucokinase
- E. Galactosyl Transferase

**Q29) A 50-year-old alcoholic male presents with pain, numbness, tingling and weakness in his feet. He is diagnosed with thiamine deficiency. Thiamine and ATP condense together to form thiamine pyrophosphate, a cofactor important for the enzymes that catalyze oxidative decarboxylation of (alpha-keto acids) in the TCA cycle and also at one of the steps in pentose phosphate pathway, which out of the following enzymes requires TPP as a coenzyme?**

- A. Glucose-6-P dehydrogenase
- B. Transaldolase
- C. Transketolase
- D. 6-P-Gluconate dehydrogenase
- E. Gluconolactone hydrolase

**Q30) A 56-year-old, obese man complains of polydipsia, polyuria and fatigue. A glucose tolerance test confirms the diagnosis of diabetes. He is placed on Metformin, which works by which of the following mechanisms?**

- A. Inhibiting hepatic gluconeogenesis
- B. Increasing glucagon level
- C. Increasing cellular responsiveness to circulating insulin
- D. Stimulating the release of preformed insulin
- E. Replacing the need for endogenous insulin

**Q31) Pyruvate dehydrogenase complex deficiency is an autosomal recessive disorder and leads to anion gap metabolic acidosis. Which of the following accumulates to cause metabolic acidosis?**

- A. Beta hydroxy butyric acid
- B. Acetoacetic acid
- C. Fumaric acid
- D. Lactic acid
- E. Hydrochloric acid

- A. Dihydroxy acetone phosphate to Glycerol-3-P
- B. Glycerol-3-P to Dihydroxy acetone phosphate
- C. Citrate to isocitrate
- D. Malate to Oxaloacetate
- E. All of the above

**Q51) A 5-year-old boy presents with altered mental status, heart failure, and muscle weakness. His serum level of ketones and glucose are abnormally low. He is diagnosed with primary carnitine deficiency. In which of the following is carnitine directly involved?**

- A. Activation of fatty acids
- B. Transport of fatty acyl CoA
- C.  $\beta$ -oxidation
- D.  $\alpha$ -oxidation
- E.  $\omega$ -oxidation

### **Amino acids Metabolism**

**Q52) A child was brought to paediatric OPD with complaint of passage of black colored urine. A disorder of phenylalanine metabolism was diagnosed. A low phenylalanine diet and a supplementation of vitamin C were recommended. Which enzyme defect is expected in this child?**

- A. Phenyl alanine hydroxylase
- B. Tyrosine transaminase
- C. Homogentistic acid oxidase
- D. Glutathione peroxidase
- E. Hydrolase

- A. It is activated by carboxylation
- B. It catalyzes a reaction that condenses an acyl group with Malonyl group
- C. It catalyzes a reaction that requires biotin and ATP
- D. It converts Malonyl CoA to Acetyl CoA
- E. It is activated by Malonyl CoA

**Q49) A 50-year-old, alcoholic male presents with a swollen face, distended abdomen, and an enlarged fatty liver. Fatty acids react with glycerol-3-P to form triglycerides, which accumulate to cause fatty liver. The liver has glycerol kinase, while adipose tissue lacks glycerol kinase. As a result, in adipose tissue, which of the following occurs?**

- A. Glucose can not be converted to DHAP
- B. Glycerol can not be converted to Glycerol-3-P
- C. DHAP can not be converted to Glycerol-3-P
- D. Diacylglycerol can not be converted to Triacylglycerol
- E. Triacylglycerol can not be stored

**Q50) A 25-year-old man is brought to the emergency room after a motor vehicle accident. He has a dislocated hip, rib fractures and a facial laceration. Toxicology screen shows a high level of ethanol in his blood. Oxidation of ethanol produces acetaldehyde and NADH. A high level of NADH relative to NAD<sup>+</sup> slows TCA cycle and promotes the conversion of which of the following reactions?**

**Q32) A 3 year-old child presents with a history of recurrent rash upon sun exposure and passage of purple colored urine. The child is diagnosed with Congenital Erythropoietic porphyria, a disorder of a pathway of haem biosynthesis. Which of the following intermediates of TCA cycle is used as a precursor for haem biosynthesis?**

- A. Succinyl CoA
- B. Acetyl CoA
- C. Succinate
- D. Malate
- E. Pyruvate

**Q33) A patient has chronic obstructive pulmonary disease; enough oxygen is not reaching her tissues. All of the followings are expected EXCEPT-**

- A. The electron transport chain would be inhibited
- B. Glycolysis would be activated by a low ATP/ADP
- C. More than normal amounts of ATP would be synthesized
- D. Concentration of NADH and pyruvate would be lower than normal
- E. More than normal amounts of lactate would be produced

**Lipid Metabolism**

**Q34) In cystic fibrosis, the pancreatic ducts become obstructed by viscous mucus. Consequently digestion of which of the following substances would be most impaired?**

- A. Starch
- B. Glycogen
- C. Cellulose
- D. lipids
- E. Maltose

**Q35) A 34-year-old female has been diagnosed with type 1 hyperlipidemia. Which of the following lipoprotein concentration is elevated in such disorder?**

- A. VLDL
- B. LDL
- C. IDL
- D. Chylomicrons
- E. All of the above

**Q36) An infant is born prematurely at 28 weeks and has developed increasing difficulty in breathing. His skin starts to turn blue from lack of oxygen (cyanosis). He is diagnosed with Respiratory distress syndrome due to deficiency of lung surfactant. Which of the following is the phospholipid of primary importance in surfactant?**

**Q46) A 35-year-old man presents with yellow xanthomas on his skin and hepatomegaly (enlarged liver). His triglyceride level is 1500 mg/dl. He is diagnosed with type V hyperlipidemia. Triglycerides are primarily synthesized in which of the following tissues?**

- A. Skeletal muscle
- B. Heart muscle
- C. Liver
- D. Spleen
- E. Blood cells

**Q47) An 18-year-old female is diagnosed as obese. She maintains a sedentary life style and eats a high-fat, high-sugar diet. Maintenance of this diet and lifestyle has led to lipogenesis and obesity. Which of the following affects excessive fatty acid synthesis?**

- A. Glycerol is obtained through glycolysis
- B. Fatty acids are excessively synthesized from Acetyl CoA
- C. NADPH is excessively obtained from HMP pathway
- D. Triglycerides are excessively synthesized
- E. A of the above

**Q48) A 30-year-old pregnant woman has a sugar craving and consumes a hot fudge sundae. Her serum glucose level increases, which causes release of insulin. Insulin is known to increase the activity of acetyl CoA carboxylase, the rate limiting enzyme of fatty acid biosynthesis. Which of the following best describes this regulatory enzyme?**

- A. IDL
- B. Chylomicrons
- C. HDL
- D. Cholesterol esters
- E. Cholesterol

**Q44) A 23-year-old female presents with low red blood cell count, corneal opacities and kidney insufficiency. She is diagnosed with lecithin: cholesterol acyl transferase (LACT) deficiency. In which of the following reactions LACT is involved?**

- A. Transfer of cholesterol esters from HDL to VLDL
- B. Hydrolysis of HDL
- C. Uptake of cholesterol from liver cells
- D. Converting cholesterol to Cholesterol esters
- E. Promoting uptake of HDL in to liver cells

**Q45) A 45-year-old female presents with severe upper abdominal pain, nausea, and vomiting. She is diagnosed with Pancreatitis (an inflammation of the pancreas). Her serum triglyceride level is found to be 3000 mg/dl and is deemed as the cause for Pancreatitis. To form triacylglycerol, which of the following is added to diacylglycerol?**

- A. Glycerol
- B. Glycerol-3-Phosphate
- C. Fatty acyl CoA
- D. Acetyl CoA
- E. Succinyl CoA

- A. Dipalmitoyl Phosphatidyl choline
- B. Dipalmitoyl Phosphatidyl ethanolamine
- C. Dipalmitoyl phosphoglyceride
- D. Dipalmitoyl Phosphatidyl inositol
- E. Dipalmitoyl Phosphatidyl serine

**Q37) A deficiency of Apo protein C-II results in the disease hyperlipoproteinaemia type 1, in which there is a significant increase in the concentration of plasma triacylglycerol. Which of the following is true about the condition?**

- A. VLDL and HDL increase
- B. Plasma appears milky
- C. There is a risk for premature IHD
- D. Serum cholesterol increases
- E. Apo C-11 acts as an activator of LACT enzyme.

**Q38) A patient presents in your office with very high levels of serum cholesterol. He states that he has tried to follow the diet and exercise regimen you give him last year. You decide that this patient would benefit from drug such as Lipitor (atorvastatin). This class of drugs is effective in treating hypercholesterolemia because it has what effect?**

- A. Stimulates phosphorylation of the B-hydroxy-B-methyl glutaryl-CoA reductase enzyme
- B. Decrease the stability of the B-hydroxy-B-methyl glutaryl-CoA reductase protein

- C. Binds cholesterol preventing it from being absorbed by the intestine
- D. Directly prevents the deposition of cholesterol on artery walls
- E. Inhibits the enzyme B-hydroxy-B-methyl glutaryl-CoA reductase

**Q39) A patient has been on combination statin and Cholestyramine therapy to lower his serum cholesterol levels. Prior to any surgery, this patient would be well advised to be supplemented with which of the following?**

- A. Vitamin A
- B. Vitamin B12
- C. Vitamin C
- D. Vitamin K
- E. Linolenic acid

**Q40) Laboratory results for a patient with uncontrolled Type 1 diabetes mellitus reveal hyperglycemia (634mg/dl) and hypertriglyceridemia (498mg/dl). The most likely cause of the hypertriglyceridemia in this patient is which of the following?**

- A. Deficiency in Apo protein C-11
- B. Increased hepatic triglyceride synthesis
- C. Decreased lipoprotein lipase activity
- D. Deficiency in LDL receptors
- E. Absence of hormone-sensitive lipase

**Q41) A patient with hereditary type 1 hyperlipidemia presents with elevated levels of chylomicrons and VLDL triglycerides in the blood. The main function of the chylomicrons in circulation is to do which of the following?**

- A. Transport lipid from the liver
- B. Transport dietary lipids from the intestine to target tissues
- C. Transport cholesterol from IDL to LDL
- D. Act as a receptor for triacylglycerol in the liver
- E. Bind cholesterol esters exclusively

**Q42) A 60-year-old woman presents with chest pain radiating to her left arm. She is diagnosed with Myocardial infarction and is prescribed a statin medication. Statins inhibit HMG CoA reductase. How does inhibition of HMG CoA reductase cause lowering of cholesterol and LDL levels?**

- A. It increases serum level of HDL
- B. It decreases serum level of LDL by promoting catabolism
- C. It inhibits the formation of LDL from IDL
- D. It inhibits the rate limiting step in cholesterol biosynthesis
- E. It inhibits synthesis of LDL receptors

**Q43) A 40-year-old man presents with severe pain in the legs upon walking. He is diagnosed with atherosclerosis plaques in the arteries of his legs. High level of cholesterol and LDL contribute to the formation of atherosclerosis. Which of the following is digested to form LDL?**