METABOLISM

FINAL

Past Papers

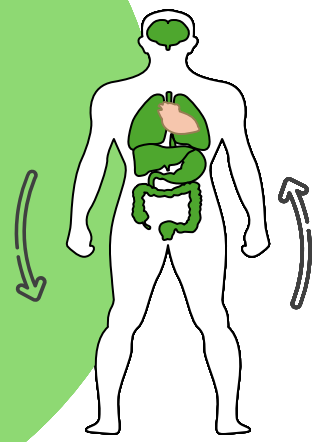
بسم الله الرحمن الرحيم

﴿ وَإِن تَتَوَلَّوْا يَسْتَبْدِلْ قَوْمًا غَيْرَكُمْ ثُمَّ لَا يَكُونُوا أَمْثَالَكُم ﴾

اللهم استعملنا ولا تستبدلنا

Written by:

- **Hala Alka’abneh**
- **Layan Al-Amir**



Amino Acid Metabolism

Question 1 :

A female neonate did well until approximately 24 hours of age when she became lethargic. A sepsis workup proved negative. At 56 hours, she started showing focal seizure activity. The plasma ammonia level was found to be 1,100 µmol/L (normal 5– 35 µmol/L). Quantitative plasma amino acid levels revealed a marked elevation of argininosuccinate. Which one of the following would also be elevated in the blood of this patient?

a. Asparagine.

b. Glutamine.

c. Lysine.

d. Urea.

Ans:B

Question 2:

Which one of the following statements concerning amino acids is correct?

a. An increase in gluconeogenesis from amino acids results in a decrease in urea formation.

b. All essential amino acids are glycogenic.

c. Ornithine and citrulline are found in tissue proteins.

d. Cysteine is an essential amino acid in individuals consuming a diet severely limited in methionine.

Ans:D

Question 3:

-During the last hours of a 48hour fast, which of the following is used as a source of energy?

a. Amino acids

b. Glycogen

c. Lactate

d. Nucleotides

Ans:A

Question 4:

The only AA that will not enter krebs cycle as Succinyl CoA?

A. Methionine

b. Histidine

c. Threonine

d. Valine

AnsB:

Question 5:

The main acceptor of NH_3 in deamination reactions:

a. Glutamate

b. a-ketoglutarate

c. Glutamine

d. Alanine

Ans:B

Question 6:

A 1-week-old infant, who was born at home in a rural, medicallyunderserved area, has undetected classic phenylketonuria. Which statement about this baby and/or her treatment is correct?

a. A diet devoid of phenylalanine should be initiated immediately.

b. Phenylpyruvate is found in the urine.

c. Supplementation with vitamin B6 is required.

d. Tyrosine is a nonessential amino acid

Ans: D

Question 7:

A patient with an inherited disorder has blue speckled discoloration of skin, was found to have kidney stones and has black urine, this disorder involves the accumulation of?

a. Homogentisic acid

b. Phenylalanine

c. Homocysteine

d. Cystathionine

Ans:A

Question 8:

choose the wrong relation:

a- ALT+ AST with liver disease

b- ALT with myocardial infraction

Ans:B

Question 9:

Mismatch between the amino acid and its synthesis:

a-PHE-Thr hydroxylation

b- Asn-Asp amidation

Ans:A

Question 10:

Something true about urea cycle:

activated by rich protein diet

Ans:

Question 11:

true sentence about amino acid digestion :

a-mono peptides are absorbed by diffusion

b- Di-Peptides are taken up by H+-Linked transport system

c- monopeptides enters the portal system by NA+ linked transport

Ans:B

Question 12:

Which of the following is the INCORRECT match Amino acid Catabolic intermediate Glucogenic and/or ketogenic :

A. Tyrosine Fumarate Glucogenic and ketogenic

B. Proline α-ketglutarate Glucogenic

C. Serine Glutamate Ketogenic

D. Arginine α-ketglutarate Glucogenic

E. Threonine Succinyl-CoA Glucogenic

Ans:C

Question 13:

new born who refuses feeding has been diagnosed with cystathionine-β- synthase deficiency. What is the diagnosis of his condition?

A. Albinism

B. Homocystinuria

C. Maple syrup urine disease

D. Hyperammonemia

E. Alkapronyria

Ans:B

Question 14:

A patient who has a glutamine synthetase deficiency would have all of the following EXCEPT:

A. Glutamate amination to glutamine is compromised

B. Transport of ammonia from most tissues to liver is hindered

C. Toxic levels of ammonia may accumulate in the patient's tissues and/or blood

D. Transport of ammonia from muscle cells to the liver is not affected

E. Transamination of α–ketoglutarate to glutamate is downregulated

Ans:E

Question 15:

Mismatch pairs, each AA with its precursor: .

A. Tyrosine - melanin

B. Tyrosine - norepinephrine

C. Threonine -serotonin

D.histidine –histamine

E. arginine and glycine, creatine

Ans:C

Question 16:

What is the true if glutamate undergo transamination then by the enzyme glutamate dehydrogenase?

A- This require ATP

B- require NADPH

C- net product is alphaketoglutarate

D- Net product is ammonia

E- all of the above

Question 17:

Which of the following amino acids match with the corresponding catabolic product :

A- (gutamate,glutamine, alanine ,arginine) > pyruvate

B-(histidine,glutamate,arginine,proline)>alpha ketoglutarate

C- (isoleucine, valine , tryptophan) > succinyl CoA
D- (aspartate, phenylalanine, tyrosine) > OAA

Ans:B

Question 18:

Phenyl alanine enters TCA cycle as:

Answer: Fumarate

Ans:

Question 19:

Main purpose of TCA cycle :

Answer: Extraction of electrons

Ans:

Question 20:

Intracellular protein degradation mechanism :

a- ubiquition enzyme for tagging and degradation

b- requires ATP

Ans:B

Question 21:

Something true about urea cycle:

a-N_acetylglutamic acid is initiator of the cycle

b-activated by rich protein diet

Ans:B

Question 22:

hyperPHE caused by :

Dihydropteridine reductase

PHE : Phenylalanine

Question 23:

Alkaptonuria is caused due to accumulation of _____ That is caused by a deficiency in _____.

Answer: Homogenestic acid/homogentisic acid oxidase enzyme

Ans:

Question 24:

Protein degradation by proteasome can be described as follows:

a. Uses receptor mediated endocytosis to enter proteins into the proteasomal core.

b. Uses a single ubiquitin molecule to tag a protein for degradation.

c. Degrades extracellular and membrane proteins.

d. Needs the globular ubiquitin enzyme that degrades proteins.

e. Requires energy for ubiquitination.

Ans:E

Question 25:

Which one of the following statements concerning a l-week-old male infant with undetected classic phenylketonuria is CORRECT?

a. Hypopigmentation is characteristic for these patients.

b. Tyrosine is a nonessential amino acid for the infant.

c. Therapy must begin after the first year of life.

d. Low levels of phenylpyruvate appear in his urine.

e. When the infant reaches adulthood, it is recommended that diet therapy be discontinued

Ans:A

Question 26:

Which of the following is an essential amino acid?

a. Cysteine

b. Methionine

c. Arginine

d. Tyrosine

e. Glutamate

Ans:B

Question 27:

Liver function test…Which enzyme is sensitive? Which is specific?

Answer: ALT ___ Specific

AST ___ Sensitive

Ans:

Question 28:

Wrong about Urea cycle?

Answer: The reaction that is catalyzed by OTC is the ratelimiting step.

Ans:

Question 29:

Tetrahydrobiopterin is involved in the degradation of 3 amino acids which are?

Answer: Phe, Tyr, Trp

Ans:

Question 30:

Because of its toxicity, ammonia is transported from tissues to the liver in the form of :

Answer: Glutamine

Ans:

Question 31:

Which of the following occurs in PKU patient
Answer:

It happens because there is a deficient enzyme (phenylalanine hydroxylase) which produces tyrosine from phenylalanine thus tyrosine becomes an essential amino acid .

Ans:

Question 32:

In alkaptonuria patient, the metabolism of _____ is stopped thus causing accumulation of _____.

Answer: Tyrosine, Homogenestic acid

Ans:

Question 33:

Which of the following is a glucogenic amino acid that produces pyruvate and succinyl CoA upon degradation ?

Answer: Threonine

Ans:

Question 34:

Which of the following enzymes can fix free ammonia into a chemical molecule?

A) Glutamate dehydrogenase

B) SAH hydrolase

C) Glutaminase

D) Serine hydroxymethyl transferase

Ans:A

Question 35:

One of the following amino acids is essential and glucogenic:

A) Glutamine

B) Tyrosine

C) Threonine

D) Serine

Ans:C

Question 36:

Ubiquitin - proteosome system?

A) ATP independent

B) At least 3 ubiquitin attached to protein

C) ATP dependent

D) Amino acids release by enzyme inside proteasome

Ans:C

Question 37:

Sulfur group in cysteine comes from:

A) Serine

B) Homocysteine

C) SAM

Ans:B

Question 38:

Symptoms of People who have phenylketonuria:

A) Hypophenylalanine

B) Increase concentration of phenylalanine

C) Not effect of IQ

Ans:B

Question 39:

Which of the following statements describes the ubiquitin mediated degradation of proteins in the cytosol?

A) After degradation, ubiquitins are transferred extracellularly for excretion.

B) The process is ATP dependent

C) The degradation results in free amino acids released in the cytosol

D) This pathway is more specific to extracellular proteins

Ans:B

Question 40:

In the urea cycle, how many ATPs are used?

Answer: 3

Ans:

Question 41:

Which of these reactions is reversible?

Answer: oxidative deamination

Ans:

Question 42:

Hyperphenylalanimia caused by deficiency in which enzyme:

A. Dihydropetritidine reductase

B. Dihydropetritidine DH

C. Tyrosinase

Ans:A

Question 43:

All the following are glucogenic except:

A. Leu

B. Pro

C. Ile

D. Gly

E. Glu

Ans:A

Question 44:

Homocysteine increases due to:

Answer: Methionine synthetase deficiency

Ans:

Question 45:

Example of an exopeptidase:

A. Carboxypeptidase

B. Trypsin

C. Trypsinogen

D. Pepsin

E. Chymotrypsin

Ans:A

Question 46:

One of the following is correct about UREA cycle:

A. Activated by Lysine

B. Activated by keto diet

C. initiated by N-acetylglutamate

D. produces ATP

E. occurs in all tissues but primarily in the Liver

Ans: C

Question 47:

If we have an intracellular protein called WINTER protein, choose the true statement about its degradation:

Answer: ATP is used in the ubiquitination process

Ans:

Question 48:

Absorption of dipeptides happens by:

Answer: passive diffusion

Ans:

Question 49:

Serine is synthesized from ?

Answer : Glycine

Ans:

Question 50:

What is in common between oxidative deamination and transamination ?

Answer : -both of them are reversible

-both of them use NADPH

Ans:

Question 51:

Converting Asp into Asn ?

Answer : Amidation

Ans:

Question 52:

In celiac disease the affected enzyme is :

Answer : Transglutaminase

Ans:

Question 53:

One of the following is in common between transamination and oxidatvie deamination :

Answer : both produce substrates of uric cycle

Ans:

Question 54:

What is the amino acid that can produce Fumarate?

Answer: Phenylalanine.

Ans:

Question 55:

What is X & Y in the following reaction?

X + Y ——> Oxaloacetate + Glutamate

Answer: Aspartate, alpha ketoglutarate.

Ans:

Question 56:

Which amino acid is exclusively ketogenic?

Answer: Leucine.

Ans:

Question 57:

regarding the degradation of cytosolic enzymes which is true?

A) requires ATP for endocytosis

B) will face acidic environment in the digesting organelle

C) requires ATP to be labelled

Ans:C

Question 58:

The following two amino acids are keys to the transfer of amino groups during breakdown and synthesis of amino acids :

a.ALA & GLN

b.GLU & ASP

c.GLU&ARG

d.GLU&GLN

e.ASP &GLN

Ans:A

Question 59:

An individual is experiencing symptoms consistent with niacin deficiency . In this patient , supplementation of which amino acid might be helpful ?

a.Met

b.Glu

c.Leu

d.Ala

e.Trp

Ans:E

Question 60:

If an individual has a B6 deficiency ,which one of the following amino acid could still be synthesised and be considered non essential ?

a.Cys

b.Ser

c.Asp

d.Ala

e.Tyr

Ans:E

Question 61:

Considering the following diagram that represents the urea cycle , which of the following is wrong ?

a.A&C represents the source of N in F

b.B&G transported out of and into the mitochondria , respectively

c.step 1 is the rate limiting step

d.step 5 is catalysed almost exclusively in the liver

e.step2 through 5 occur in the cytosol

Ans:E

Question 62:

All of the folowing regarding protein digestion are true except :

a.pepsin has two modes of activation: acid induce and autocatalytic activation

b. enterokinase activates trypsinogen

c.stomach acidity hydrolases dietary protiens into long polypeptide chains

d.free amino acids and dipeptides are taken by the intestinal cells , however , by different modes of entry

e.trypsin is the common activator of all pancreatic zymogens

Ans:C

Question 63:

Proteolytic enzymes must br secreted by zymogens that are activated , outherwise they would auto digest themselves and the organs that produce them. Trypsinogen , a zymogen , is cleaved to form trypsin by a protease that is secreted by which of one of the following ?

a.colon

b.liver

c.pancreas

d.stomach

e.small intestine

Ans:E

- *A defective glucorodyl transferase is associated with all of the following except*
- *A. gilbert syndrome*
- *B. criggler najjjar*
- *C. liver cirrhosis*
- *D. dubin Johnson syndrome*

- *Answer: D*

- *Which substrate is common for purines, heme and creatine synthesis*
- *A. Glycine*
- *B. Succinate*
- *C. Arginine*
- *D. Aspartate*
- *E. Alpha-ketoglutarate*

- *Answer: A*

- *Which of the following regarding protein digestion is true*
- *A. High pH value in the stomach helps in hydrolysis of some proteins*
- *B. Pepsin can only be activated through autocatalytic activation*
- *C. Free amino acids are the only form that is taken up by intestinal cells*
- *D. Trypsin is the common activator of all pancreatic zymogens*
- *E. Trypsin can only be activated through autocatalytic activation*

- *Answer: D*

- *The two nitrogen atoms in urea are derived directly from*
- *A. Aspartate and Ammonia*
- *B. Asparagine and Glutamine*
- *C. Glycine and Glutamine*
- *D. Glutamine and Ammonia*
- *E. Glutamate and Glutamine*

- *Answer: A*

- *When comparing infant I (low blood arginine; high blood ammonia) to infant II (high blood arginine; moderately high blood ammonia), infant II might have a problem in…*
- *A. CPS I*
- *B. Arginase*
- *C. Argininosuccinate lyase*
- *D. Argininosuccinate synthase*
- *E. OTC*

- *Answer: B*

- *How many ATP equivalents are required to produce one molecule of urea from ammonia and aspartate*
- *A. 2*
- *B. 4*
- *C. 1*
- *D. 3*
- *E. 6*

- *Answer: B*

- *If an individual has a vitamin B6 deficiency, which one of the following amino acids could still be synthesized and be considered non essential*
- *A. Cysteine*
- *B. Serine*
- *C. Aspartate*
- *D. Alanine*
- *E. Tyrosine*

- *Answer: E*

- *Which of the following statements describes the ubiquitin mediated degradation of proteins in the cytosol*
- *A. After degradation of the protein, ubiquitins are transferred extracellularly for excretion*
- *B. The process is ATP-dependent*
- *C. The degradation results in free amino acids released into the cytosol*
- *D. This pathway is more specific to extracellular proteins*
- *E. One molecule of ubiquitin is attached to the protein to be degraded*

- *Answer: B*

- *Regarding heme synthesis in the liver, all statements are correct EXCEPT*
- *A. Uroporphyrinogen III is synthesized from porphobilinogen*
- *B. ALA synthase requires pyridoxal phosphate and located in mitochondria*
- *C. ALA synthase can be induced by many drugs*
- *D. Synthetic pathway involves carboxylation reactions at more than one step*
- *E. ALA synthase is suppressed by hemin*

- *Answer: D*

- *Melatonin is made of the following Amino acid*
- *A. Tyr*
- *B. Phe*
- *C. Arg*
- *D. Thr*
- *E. Trp*

- *Answer: E*

- *Newborns jaundice can be described as follows*
- *A. Liver cells function is abnormal*
- *B. Glucuronyl transferase levels are lower than in a normal newborn*
- *C. Conjugated bilirubin levels are higher than albumin capacity to bind toxicity*
- *D. Newborn exposure to blue fluorescent light produces water-insoluble photoisomers*
- *E. Conjugated bilirubin levels are high in these infants*

- *Answer: B*

- *Gilbert syndrome is caused by a deficiency of the following enzyme*
- *A. Tyrosine hydroxylase*
- *B. Heme oxygenase*
- *C. bilirubin glucuronyl-transferase*
- *D. Biliverdin reductase*
- *E. ALA synthase*

- *Answer: C*

- *Which of the following is not synthesized by tyrosine*
- *A. Melatonin*
- *B. Dopamine*
- *C. Melanin*
- *D. Epinephrine*
- *E. All answers are Correct*

- *Answer: A*

- *Which of the following enzymes is inhibited by Lead*
- *A. ALA dehydratase*
- *B. Ferroxidase*
- *C. ALA synthase*
- *D. Biliverdin reductase*
- *E. Tyrosine hydroxylase*

- *Answer: A*

- *Which of the following describes heme synthesis*
- *A. Fe+2 addition is the rate limiting step that requires ATP hydrolysis as an energy source*
- *B. Two molecules of porphobilinogen are combined in a tetrapyrrole ring*
- *C. Fe+2 is added by the cvtosolic ferrochelatase enzyme*
- *D. Four ALA molecules are combined to produce porphobilinogen*
- *E. Gly and succinyl-CoA are precursors for heme synthesis*

- *Answer: E*

- *Regarding urea cycle, which of the following statements is NOT CORRECT*
- *A. Urea nitrogen atoms are derived indirectly from glutamate*
- *B. Urea cycle enzymes are induced by high protein diet or starvation*
- *C. Urea formation takes place in liver only*
- *D. N-acetyl glutamate is an activator of urea cycle*
- *E. Urea cycle just like CA cycle takes place completely in the mitochondria*

- *Answer: E*

- *Which of the following amino acids match with the corresponding catabolic product*
- *A. (glutamate, glutamine, alanine ,arginine) > pyruvate*
- *B. (histidine, glutamate, arginine, proline)>alpha ketoglutarate*
- *C. (isoleucine, valine , tryptophan) > succinyl CoA*
- *D. (aspartate, phenylalanine, tyrosine) > OAA*
- *E. Nothing are Correct*

- *Answer: B*

- *The molecule which is attached to other molecules to make them more polar is*
- *A. Glucose*
- *B. Glucoronate*
- *C. Bilirubin*
- *D. Gluconic acid*
- *E. Fructose*

- *Answer: B*

- *Gilbert' syndrome*
- *Answer: Deficiency in bilirubin diglucuronosyltransferase*

- *A Coenzyme derived from Vitamin B12 is needed for*
- *A. Synthesis of D-Methylmalonyl CoA*
- *B. Formation of Guanidinoacetate*
- *C. Decarboxylation of Uroporphyrinogen III*
- *D. Proprionyl CoA metabolism*

- *Answer: D*

- *Which of amino acid the following compounds is CORRECTLY matched with the precursor*
- *A. 5 Histamine, tyrosine*
- *B. Creatine, lysine*
- *C. Epinephrine, aspartate*
- *D. Serotonin, tryptophan*
- *E. Melanin, tryptophan*

- *Answer: D*

- *Bilirubin is transported to hepatocytes via(Important)*
- *A. Facilitated diffusion*
- *B. Conjugation to nucleotidesion*
- *C. Na+/K+ pump*
- *D. Active transport*
- *E. Proton pump*
- *Answer: A*

- *Transport of conjugated bilirubin through bile by*
- *Answer: active transport*

- *Bilirubin bind to albumin through*
- *Answer: Non covalent binding*

- *Creatine…*
- *Answer: Can be given as a supplement*

- *Histidine > Histamine. Reaction type*
- *Answer: Decarboxylation*

- *Liver function test...Which enzyme is sensitive? AST*
- *Which is specific? ALT*

- *All of the following shared between Krebs cycle and Urea cycle EXCEPT*
- *A. CO2*
- *B. Fumarate*
- *C. ATP*
- *D. Acetyl CoA*
- *E. Aspartate*

- *Answer: C*

- *What is the cause of complete inhibition of heme synthesis*
- *A. ALA dehydrates deficiency*
- *B. Congenital erythropoietic porphyria*
- *C. Erythropoietic protoporphyria*
- *D. Uroporphyrinogen III decarboxylase deficiency*

- *Answer: D*

- *In what types of jaundice urobilinogen is absent*
- *A. Obstructions*
- *B. Hemolytic*
- *C. Hepatic*
- *D. Hepatocellular*
- *E. Prehepatic*

- *Answer: A*

- *One of the following is TRUE considering nitrogen containing compounds*
- *A. Sources of carbon atoms in creatine structure are: glycine, arginine, and SAH*
- *B. Tyrosine hydroxylase catalyzes the rate limiting step in catecholamine synthesis*
- *C. In hepatocellular jaundice; stool may be pale and urinary urobilinogen is absent*
- *D. Conjugated bilirubin is oxidized to urobilinogen then gets reduced to urobilin in the kidneys*
- *E. Conjugated bilirubin is oxidized to urobilinogen then gets reduced to stercobilin by intestinal flora*

- *Answer: B*

- *OTC deficiency and UMP synthase deficiency can result in one of the following conditions*
- *A. Orotic aciduria*
- *B. Megaloblastic anemia*
- *C. Hyperphenylalaninemia*
- *D. Hyperammonemia*
- *E. Albinism*

- *Answer: A*

- *Albumin binds all of the following EXCEPT*
- *A. Free fatty acids*
- *B. Steroid hormones*
- *C. Conjugated billirubin*
- *D. Calcium+2*

- *Answer: C*

- *In alkaptonuria patient, the metabolism of accumulation of…… is stopped thus causing accumulation of …..*
- *Answer: Tyrosine, Homogenestic acid*

- *Which of the following is a glucogenic amino acid that produces pyruvate and succinyl CoA upon degradation*
- *Answer: Threonine*

- *The rate limiting step in heme synthesis*
- *Answer: Uses glycine as a substrate*

- *S-adenosylmethionine is used for the synthesis of*
- *Answer: Creatine*

- *Catecholamines are degraded by*
- *Answer: MA0 and COMT*

- *What is true about homocystinuria*
- *Answer: treatment restriction of methionine & supplementation of Vit B12, B6 & folate*

- *What is the wrong sentence about creatine syntheses*
- *Answer: it’s an irreversible reaction*

- *Transport of ammonia*
- *Answer: alanine and glutamine*

- *Where is the heme production process which considered in a relatively constant rate*
- *Answer: erythrocyte producing cells of bone marrow*

- *What is the correct sentence about protein digesting*
- *Answer: chymotrypsin cut the aromatic amino acid in the C terminal*

- *Which of these reactions is reversible*
- *Answer: oxidative deamination*

Which is true about lactose synthesis?

A) Inhibited by prolactin.
B) Galactose-6- phosphate is added to glucose using lactose synthases to produce
lactose.
C) Alpha lactalbumin (protein B) is responsible for specificity by decreasing the
enzyme’s km to glucose.

Answers : C

Synthesis of which of the following is not affected by glutathione?

A) Prostaglandins
B) Prostacyclins
C) Thromboxane
D) Leukotriens
E) Lipoxins

Answers : E

The source of nitrogen in purine synthesis?
I: glutamate. II: glutamine. III: aspartate. IV: glycine.
V: n5-methyltetrahydrofolate.

A) I, II, IV.
B) II, III, IV.
C) II, IV, V
D) I, II, III E) I, III, IV.

Answers : B

During fasting for 24 hours, which of the following enzymes/ metabolic activities will be decreased in comparison to after 1 hour of eating a mixed meal?
I: Glycogenesis. II: Glycogen phosphorylase. III: protein synthesis.
IV: Protein degradation. V: Pyruvate carboxylase. VI: Pyruvate kinase.

A) 2,4,5
B) 1,3,5
C) 1,2,5
D) 1,3,6
E) 2,4,6

Answers : D

Serotonin synthesis involves:
A. Deamination
B. Methylation
C. Decarboxylation
D. Carboxylation
E. Isomerization

Synthesis of all the following require methylation except:
A. Creatine
B. CTP
C. TTP
D. Epinephrine
E. None of the above

Answer: C , B

One of the following is wrong about jaundice:
Answer: exposure to blue, fluorescent light aids in glucorynation of bilirubin.

Correct about Lesch-nyhan syndrome:
Answer: caused by hyperuricemia

Source of methyl group in conversion of guanidinoacetate to creatine is:
Answer: SAM

METABOLISM

بسم الله الرحمن الرحيم

FINAL

Past Papers

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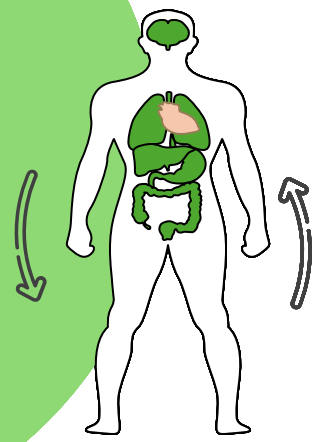
اللهم استعملنا ولا تستبدلنا

Written by:

- **Layan Al-Amir**



Nucleotide Metabolism

Question 1:

Which one of the following enzymes of nucleotide metabolism is correctly paired with its pharmacologic inhibitor?

a. Dihydrofolate reductase-methotrexate

b. Inosine monophosphate dehydrogenase-hydroxyurea

c. Ribonucleotide reductase-5-fluorouracil

d. Thymidylate synthase -allopurinol

Ans:a

Question 2:

A 42-year-old male patient undergoing radiation therapy for prostate cancer develops severe pain in the metatarsal phalangeal joint of his right big toe. Monosodium urate crystals are detected by polarized light microscopy in fluid obtained from this joint by arthrocentesis. This patient's pain is directly caused by the overproduction of the end product of which of the following metabolic pathways?

a. De novo pyrimidine biosynthesis

b. Pyrimidine degradation

c. De novo purine biosynthesis

d. Purine degradation

Ans:d

Question 3:

Carabomoyl phosphate synthetase synthesized in hepatic cytosol is used for:

a. Pyrimidine synthesis

b. Urea cycle activator

c. Purine synthesis

d. Activator of IMP formation

Ans: a

Question 4:

True about CPS II inhibition:

a. less pyrimidine de novo synthesis
b. less purine de novo synthesis
c. less pyrimidine salvage

Ans:a

Question 5:

True about the enzyme that produces deoxyribonucleotide:

a- ATP is a competitive activator

b- Inhibited by hydroxyurea

c- dATP is a competitive activator

Ans:b

Question 6:

Nucleotides modifications cause all except:

a-Gene expression

b-Transcription protein binding

c-Protection from degradation

d-Digestion of nucleotides

Ans:d

Question 7:

All of the following requires methylation except

a-CTP

b- dTMP

c- creatine

d- epinephrine

Ans:a

Question 8:

IMP in converted to GMP by the transfer of amine group from

a- glutamate

b- glutamine

c- aspartate

d- alanine

Ans:b

Question 9:

Which of the following is true regarding Lesch-Nyhan syndrome?

a. It is an autosomal dominant disorder leading to elevated levels of urea.

b. It involves the deficiency of hypoxanthine-guanine phosphoribosyltransferase resulting in increased uric acid production.

c. It is characterized by decreased purine synthesis and high levels of uric acid.

d. It results in the accumulation of pyrimidine nucleotides, causing reduced uric acid excretion.

Ans:b

Question 10:

Which of the following is acted on by methotrexate?

a. The reduction of folic acid to dihydrofolate by dihydrofolate reductase.

b. The conversion of tetrahydrofolate to 5,10-methylenetetrahydrofolate.

c. The reduction of dihydrofolate to tetrahydrofolate by dihydrofolate reductase.

d. The conversion of 5-methyltetrahydrofolate to tetrahydrofolate.

Ans:c

Question 11:

Fumarate is formed as a by-product from which of the following pathways?

a. Folic acid metabolism

b. Formation of Argininosuccinate

c. Formation of GMP from IMP

d. Formation of AMP from IMP

e. Release of urea from arginine

Ans:d

Question 12:

Which of the following is NOT a precursor for de novo purine biosynthesis?

a) N-formyl-terahydrofolate

b) Aspartic Acid

c) Glycine

d) Arginine

e) Glutamine

Ans:d

Question 13:

Carbamoyl phosphate synthetase (which is NOT TRUE):

a. Is found in the mitochondria

b. Is found in the cytosol

c. Is required for pyrimidine synthesis

d. Is required for purine synthesis

e. Is required for urea synthesis

Ans:d

Question 14:

Folic acid derivatives are needed for the following pathway:

a. UMP de novo synthesis.

b. Cysteine production from methionine

c. Purine de novo synthesis

d. Asparagine synthesis

e. Purine salvage pathway

Ans:c

Question 15:

dUTP is prevented from being incorporated into DNA structure during DNA replication by the action of:

a. Nucleotidase

b. Thymidylate synthase

c. Guanase

d. HGPRT

e. dUTPase

Ans:e

Question 16:

The carbamoyl phosphate that is being synthesized in the cytosol of a hepatocyte would

be used to:

a. De novo synthesize purine nucleotides.

b. Increase amino acid degradation after a protein rich meal.

c. Activate urea cycle.

d. De novo synthesize pyrimidine nucleotides.

e. Increase purine degradation and production of uric acid.

Ans:d

Question 17:

Dihydrofolate reductase is targeted by the following pharmacological inhibitor:

a. Allopurinol

b. Probenecid

c. Methotrexate

d. Hydroxyurea

e. 5-fluorouracil

Ans:

Question 18: Which of the following statements about purine and pyrimidine synthesis is correct?

a. Purine synthesis begins with the formation of carbamoyl phosphate, and pyrimidine synthesis involves the initial assembly of a ribose sugar.

b. Purine synthesis involves the formation of IMP at the end, while pyrimidine synthesis starts with the assembly of the nucleotide ring before PRPP addition.

c. Purine synthesis starts with the formation of PRPP, whereas pyrimidine synthesis incorporates PRPP near the end of the pathway.

d. Both purine and pyrimidine synthesis pathways start with the addition of PRPP to the nucleotide base.

e. In purine synthesis, PRPP is added after the formation of the nucleotide ring, while in pyrimidine synthesis, PRPP is the first molecule synthesized.

Ans:c

Question 19:

Which of the following are the main products of purine degradation in humans?

a. Urea and oxaloacetate

b. Ammonia and uric acid

c. Carbon dioxide and water

d. Glutamine and fumarate

e. Allopurinol and aspartate

Ans:b

Question 20:

Which of the following statements is true regarding nucleotide precursors?

a. Uridine is a precursor for adenylate and guanylate.

b. Cytidine is a precursor for thymidylate and uridylate.

c. Inosine is a precursor for adenylate and guanylate.

d. Thymidine is a precursor for cytidylate and uridylate.

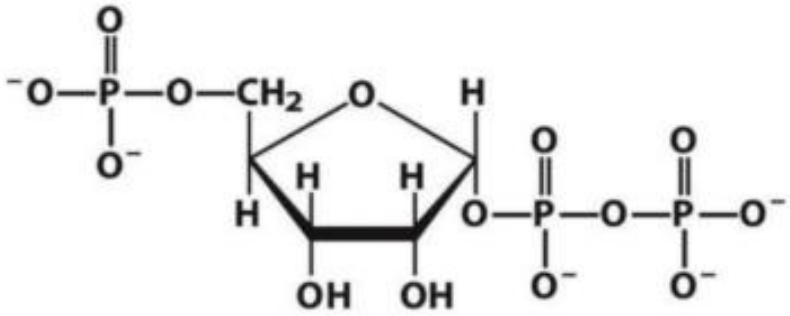
e. Guanosine is a precursor for adenylate and cytidylate.

Ans:b

Question 21:

The following structure resembles:

a. The end product of PPP pathway
b. AMP
c. Ribose 5 Phosphate
d. PRPP



Ans:d

Question 22:

What contribute to the DE NOVO synthesis of pyrimidine?

A) Fumarate

B) Glycine

C) Co2

D) THF

Ans:c

Question 23:

During the conversion of IMP to AMP in nucleotide metabolism, which of the following statements is NOT true?

a. The conversion of IMP to AMP requires GTP as an energy source.

b. Adenylosuccinate synthetase is the enzyme that catalyzes the first step in AMP synthesis from IMP.

c. The formation of AMP from IMP involves the intermediate adenylosuccinate.

d. The formation of AMP from IMP does not require any energy input.

e. Fumarate is released during the conversion of adenylosuccinate to AMP.

Ans:d

Question 24:

Which of the following treatments is effective in reducing the symptoms of gout?

a. Inhibition of PRPP synthase

b. Activation of xanthine oxidase

c. Inhibition of uric acid reabsorption

d. Inhibition of adenosine deaminase

e. Inhibition of dihydroorotate dehydrogenase

Ans:a

Question 25:

Which enzyme removes a phosphate group from a nucleic acid ?

a. Nucleutidase

b. Nucleosiadse

c. Nuclease

Ans:a

Question 26:

Which of the following about ribonucleotide reductase is correct?

a. Uses NADPH as a cofactor.

b. dATP activates the action of ribonucleotide reductase regulation.

c. dGTP activates the synthesis of dTTP.

d. dTTP activates the enzyme

Ans:d

Question 27:

A 50-year-old man experiences sudden, severe pain and swelling in his right big toe. The affected joint is red, warm, and tender. Laboratory tests reveal elevated serum uric acid levels. Which condition is most likely responsible for his symptoms?

a. Rheumatoid arthritis

b. Osteoarthritis

c. Gout

d. Septic arthritis

Ans:c
the past paper said that there was a question that depends on knowing that a symptom of gout is the swelling of the big toe, so this question is AI generated :)

- *Dihydrofolate reductase is targeted by the following pharmacological inhibitor*
- *A. Allopurinol*
- *B. Probenecid*
- *C. Methotrexate*
- *D. Hydroxyurea*
- *E. 5-fluorouracil*

- *Answer: C*

- *Fumarate is formed as a by-product from which of the following pathways*
- *A. Folic acid metabolism*
- *B. Formation of Arginino succinate*
- *C. Formation of GMP from IMP*
- *D. Formation of AMP from IMP*
- *E. None of the above*
- *Answer: D*

- *Which one of the following enzymes of nucleotide metabolism is correctly paired with its pharmacologic inhibitor*
- *A. Thymidylate synthase-allopurinol*
- *B. Ribonucleotide reductase-5-fluorouracil*
- *C. Inosine monophosphate dehydrogenase-hydroxyurea*
- *D. Dihydrofolate reductase-methotrexate*
- *E. Xanthine oxidase-probenecid*

- *Answer: D*

- *Which of the following prevents the incorporation of dUTP into the DNA during DNA synthesis*
- *A. dUTPase*
- *B. Thymidylate kinase*
- *C. Guanase*
- *D. Nucleotidase*

- *Answer: A*

- *What contribute to the DE NOVO synthesis of pyrimidine*
- *A. Fumarate*
- *B. Glycine*
- *C. Co2*
- *D. B And C*
- *E. THF*
- *Answer: D*

- *Degradation of purine produces*
- *Answer: Ammonia and uric acid*

- *During transferring IMP into AMP in nucleic acid metabolism, which of the followings is not true*
- *Answer: The formation of AMP doesn't need ATP (energy)*

- *Protoporhyrin IX is: I. Intermediate in heme synthesis II. Intermediate in heme degradation*

- *A. I only*
- *B. II only*
- *C. Both I and II*
- *D. Neither I nor II*
- *Answer: A*

- *The final product of purine degradation is -------- while the final product of pyrimidine degradation is----------*
- *A. Uric acid, beta alanine*
- *B. Urea, uric acid*
- *C. Uric acid, hypoxanthine*
- *D. Ammonia, xanthine*
- *E. PRPP, carbamoyl phosphate*
- *Answer: A*

- *Regarding purine & pyrimidine synthesis…*
- *Answer: Purine synthesis starts with formation of PRPP. Pyrimidine synthesis includes formation of PPP near the end of the pathway*

- *Regarding purine & pyrimidine synthesis…*
- *Answer: Purine synthesis starts with formation of PRPP. Pyrimidine synthesis includes formation of PPP near the end of the pathway*

- *wrong about xanthine oxidase*
- *Answer: H2O2 is the substrate*

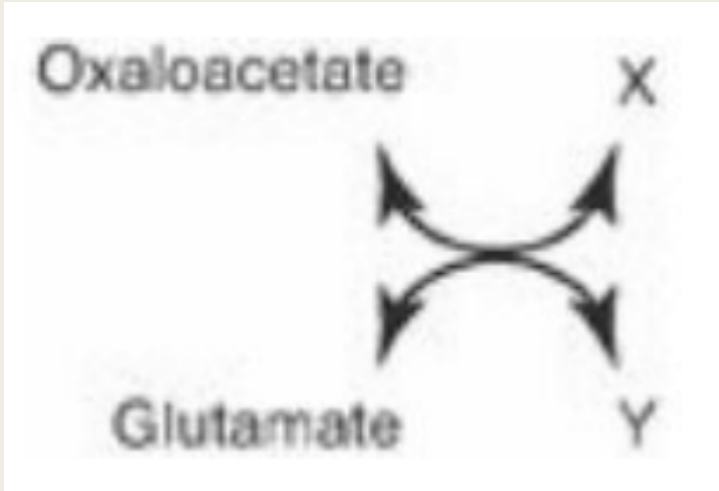
- *Orotic aciduria results when*
- *Answer: The last two enzymes Orotate phosphoribosyl transferase and OMP decarboxylase are defect*

NITROGEN METABOLISM

Past paper questions

Collected by : Dana Abubakra + Abdulrahman Ghanem

In the transamination reaction shown to the right, which of the following are the products X and Y?



- A. Alanine, α-ketoglutarate
- B. Asparate, α-ketoglutarate
- C. Glutamate, alanine
- D. Pyruvate, aspartate

- **Answer ? B**

Which one of the following statements about amino acids and their metabolism is correct?

- A. Free amino acids are taken into the enterocytes by a proton-linked .transport system
- B. In healthy, fed individuals, the input to the amino acid pool exceeds .the output .
- C. Liver uses ammonia to buffer protons
- D. Muscle-derived glutamine is metabolized in liver and kidney tissue to ammonia plus a gluconeogenic precursor
- E. The first step in the catabolism of most amino acids is their oxidative deamination
- F. The toxic ammonia generated from the amide nitrogen of amino acids is transported through blood as arginine

- Answer D

δ-Aminolaevulinic acid synthase activity:

- A. catalyses the committed step in porphyrin biosynthesis.
- B. is decreased by iron in erythrocytes.
- C. is decreased in liver in individuals treated with certain drugs such as the barbiturate phenobarbital.
- D. occurs in the cytosol.
- E. requires biotin as a coenzyme.

- Answer A

A patient presents with jaundice, abdominal pain, and nausea. Clinical laboratory studies give the following results:

Serum bilirubin	Urine urobilinogen	Urinary bilirubin
Increase in conjugated bilirubin	Not present	Present

What is the most likely cause of the jaundice?

- A. Decreased hepatic conjugation of bilirubin
- B. Decreased hepatic uptake of bilirubin
- C. Decreased secretion of bile into the intestine
- D. Increased hemolysis

Answer C

A 2-year-old child was brought to his paediatrician for evaluation of gastrointestinal problems. The parents report that the boy has been listless for the last few weeks. Lab tests reveal a microcytic, hypochromic anemia. Blood lead levels are elevated. Which of the enzymes listed below is most likely to have higher-than-normal activity in the liver of this child?

- A. δ-Aminolevulinic acid synthase
- B. Bilirubiun UDP-glucuronosyltransferase
- C. Ferrochelatase
- D. Heme oxygenase
- E. Porphobilinogen synthase

- Answer ? A

A 50-year-old man presented with painful blisters on the backs of his hands. He was a golf instructor and indicated that the blisters had erupted shortly after the golfing season began. He did not have recent exposure to common skin irritants. He had partial complex seizure disorder that had begun about 3 years earlier after a head injury. The patient had been taking phenytoin (his only medication) since the onset of the seizure disorder. He admitted to an average weekly ethanol intake of about 18 12-oz cans of beer. The patient's urine was reddish orange. Cultures obtained from skin lesions failed to grow organisms. A 24-hour urine collection showed elevated uroporphyrin (1,000 mg; normal, <27mg) The most likely diagnosis is:

- A. acute intermittent porphyria.
- B. congenital erythropoietic porphyria.
- C. erythropoietic protoporphyria.
- D. hereditary coproporphyria.
- E. porphyria cutanea tarda.

- Answer ? E

which of the following pairings is incorrect?

- A. Tyrosine - melanin
- B. Tyrosine - norepinephrine
- C. Threonine -serotonin
- D. histidine –histamine
- E. arginine and glycine - creatine

- Answer C

histamine is synthesized from histidine by:

- a- decarboxylation
- b- amination
- c- deamination
- d- carboxylation

- Answer ? A

When you are looking at the following table, which case mostly represents liver disease?

- A- III
- B- IV
- C- V
- D- I
- E- II

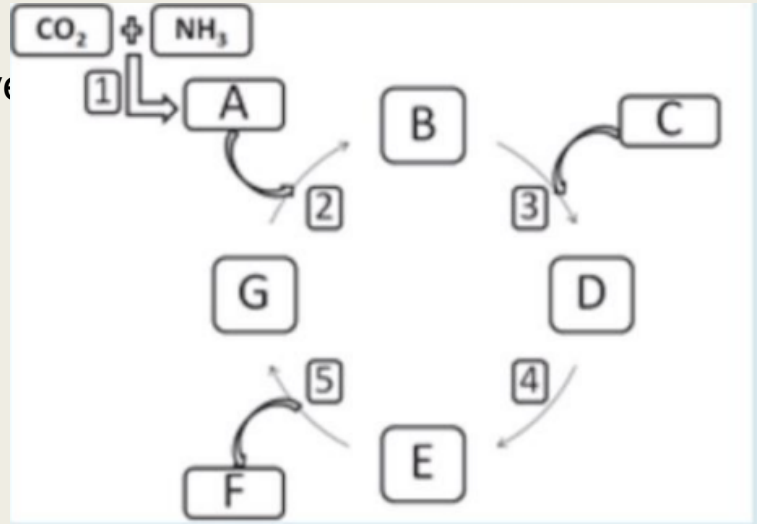
- Answer ? A

	I	II	III	IV	V
High blood levels of ALT and AST	No	No	Yes	Yes	Yes
High blood levels of bilirubin	No	Yes	Yes	Yes	No
High levels of plasma proteins	Yes	Yes	No	No	No
Edema	No	Yes	Yes	Yes	No
High levels of blood ammonia	No	Yes	Yes	No	Yes

considering the following diagram that represents the urea cycle, which of the following statements is incorrect?

- A- A & C represent the source of nitrogen atoms in F
- B- B & G are transported out of and into the mitochondria, respectively
- C- Step #1 is the rate limiting step
- D- Step number 5 is catalyzed almost exclusively in the live
- E- step 2 through 5 occur in the cytosol

- Answer ? E



The rate limiting step in prostaglandins synthesis is catalyzed by

- a) peroxidase
- b) oxygenase
- c) phospholipase A2
- d) cyclooxygenase
- e) PGG synthase

- Answer ? C

Which of the following is NOT a precursor for de novo purine biosynthesis?

- a) N-formyl-tetrahydrofolate
- b) Aspartic Acid
- c) Glycine
- d) Arginine
- e) Glutamine

- Answer D

A female neonate did well until approximately age 24 hours, when she became lethargic. A sepsis workup proved negative. At 56 hours, she started showing focal seizure activity. The plasma ammonia level was found to be 887 μmol/l (normal 5–35 μmol/l). Quantitative plasma amino acid levels revealed a marked elevation of citrulline but not arginosuccinate.

Which one of the following enzymic activities is most likely to be deficient in this patient?

- A. Arginase
- B. Arginosuccinate lyase
- C. Arginosuccinate synthetase
- D. Carbamoyl phosphate synthetase I
- E. Ornithine transcarbamoylase

- Answer

Match the deficiency of **Cystathionine β-synthase** with the corresponding clinical sign of laboratory finding in urine:

- A. Black pigmentation of cartilage
- B. Cabbage-like odor of fluids
- C. Cystine crystals in urine
- D. White hair, red eye color
- E. Increased branched-chain amino acids
- F. Increased homocysteine G. Increased methionine
- H. Increased phenylalanine

- Answer ⍰ F

Match the deficiency of **Homogentisic acid oxidase** with the corresponding clinical sign of laboratory finding in urine:

- A. Black pigmentation of cartilage
- B. Cabbage-like odor of fluids
- C. Cystine crystals in urine
- D. White hair, red eye color
- E. Increased branched-chain amino acids
- F. Increased homocysteine G. Increased methionine
- H. Increased phenylalanine

- Answer A

Match the deficiency of **Tyrosinase** with the corresponding clinical sign of laboratory finding in urine:

- A. Black pigmentation of cartilage
- B. Cabbage-like odor of fluids
- C. Cystine crystals in urine
- D. White hair, red eye color
- E. Increased branched-chain amino acids
- F. Increased homocysteine G. Increased methionine
- H. Increased phenylalanine

- Answer □ D

A 1-year-old female patient is lethargic, weak, and anemic. Her height and weight are low for her age. Her urine contains an elevated level of orotic acid. Activity of uridine monophosphate synthase is low. Administration of which of the following is most likely to alleviate her symptoms?

- A. Adenine
- B. Guanine
- C. Hypoxanthine
- D. Thymidine
- E. Uridine

- Answer E

For any feedback, scan the code or click on it.

Corrections from previous versions:

Versions	Slide # and Place of Error	Before Correction	After Correction
V0 → V1			
V1 → V2			

Additional Resources:

- Links

رسالة من الفريق العلمي:

لا اله إلا أنت سبحانك إني كنت من الظالمين
سبحان الله وبحمده، سبحان الله العظيم
اللَّهمَّ إنِّي أسألكَ من خيرِ ما سألكَ عبدكَ ونبيكَ، وأعوذ بكَ من شرِّ ما عاذَ منه عبدكَ ونبيكَ، ربي إنِّي أسألكَ الجنَّةَ وما قرَّبَ إليها من قولٍ وعملٍ، وأعوذ بكَ منَ النَّارِ وما قرَّبَ إليها من قولٍ أو عملٍ، كما أسألكَ أن تجعلَ كلَّ قضاءٍ قضيتَه لي خيرًا.