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**RAD II and DT II**

**Final term**

**BIOCHEMISTRY**

**Marks 50**

Write note on following questions each carries equal marks

Q1 .Write steps involve in uric acid formation

ANS

Uric acid is a waste byproduct. It's formed when your body breaks down purines, which are found in some foods. Purines show up when cells die and get taken apart. Most of the uric acid leaves your body when you pee, and some when you poop. If you have high levels of uric acid, it can be a sign of disease such as gout.

Synthesis of uric acid:-

* The end product of purine metabolism in human is uric acid .
* The nucleotide monophophate ( AMP,IMP and GMP) are converted to their respective nusleoside forms( adenosine,inosine and guanosine ) by the action of nucleotidase
* The amino grop eith from AMP or adenosine can be removed to produce IMP or inosine.
* Inosine and guanosine are converted to hypoxanthine and guanine by purine nucleoside phosphorylase

. Xanthine oxidase is an enzyme which catalyzes the formation of uric acid from xanthine and hypoxanthine, which in turn are produced from other purines. Xanthine oxidase is a large enzyme whose active site consists of the metal molybdenum bound to sulfur and oxygen.

2) Write down clinical significance of the following enzymes

a) Alkaline phosphatase

b) Creatine kinase

c) gamma-glutamyl transferase

ANS **ALKALINE** PHOSPHATAS

ALP test is used to detect Liver disease,Bone disorders,biliary obstruction and cancer.

•In conditions affecting the liver(e.g,hepatitis) damaged liver cells releases increase amounts of ALP in to the blood.

•ALP test is used to detect biliary obstruction(blocked bile duct)because ALP is especially high in the edges of cells that join to form bile ducts.If one or more of them are obstructed.

•Any condition that affects bone growth or causes increased activity of bone cells can affect ALP levels in the blood.

•Test may be used to detect cancers that have spread to

• Test may be used to diagnose Paget's disease that causes malformed bones.

• If ALP results are increased but it is not clear whether it is due to liver or bone disease then tests for ALP isoenzyme may also be done to determine the cause.

**Creatine kinase**

* Elevation of CK is an indication of damage to

muscle. CK value is increased in myocardial

infarction and muscle injury such as muscular

dystrophy. acute rhabdomyolysis due to

strenuous exercise. myocarditis. alcoholic

myopathy and so on.

* Following a myocardial infarction, CK rises

measurably within a 4-6 hour period. Maximal

values are observed within 24 hours, after

which time, the activity returns to normal.

* This test may be used to

1. Detect rhabdomyolysis dermatomyositis Muscular dystrophy polymyositis, and other muscle diseases
2. Determine if or how badly a muscle is damaged
3. Evaluate cause of chest pain
4. Diagnose heart attack

**gamma-glutamyl transferase**

* The enzyme present in serum appears to originate primarily from the Hepatobiliary system.

• GGT activity is elevated in all forms of liver disease like • Obs tructive jaundice

1. Cholangitis
2. Cholecystitis
3. Biliary atresia
4. Infectious hepatitis

3) How many proteins are involve in electron transport chain and how do electrons move in the electron transport chain?

ANS There are four protein complexes (labeled complex I-IV) in the electron transport chain, which are involved in moving electrons from NADH and FADH2 to molecular oxygen.

* Complex I establishes the hydrogen ion gradient by pumping four hydrogen ions across the membrane from the matrix into the intermembrane space.
* Complex II receives FADH2, which bypasses complex I, and delivers electrons directly to the electron transport chain.
* Complex III pumps protons through the membrane and passes its electrons to cytochrome c for transport to the fourth complex of proteins and enzymes.
* Complex IV reduces oxygen; the reduced oxygen then picks up two hydrogen ions from the surrounding medium to make water.

**ELECTRON TRANSPORT CHAIN**

The electron transport chain is the portion of aerobic respiration that uses free oxygen as the final electron acceptor of the electrons removed from the intermediate compounds in glucose catabolism. The electron transport chain is composed of four large, multiprotein complexes embedded in the inner mitochondrial membrane and two small diffusible electron carriers shuttling electrons between them. The electrons are passed through a series of redox reactions, with a small amount of free energy used at three points to transport hydrogen ions across a membrane. This process contributes to the gradient used in chemiosmosis. The electrons passing through the electron transport chain gradually lose energy, High-energy electrons donated to the chain by either NADH or FADH2 complete the chain, as low-energy electrons reduce oxygen molecules and form water. The level of free energy of the electrons drops from about 60 kcal/mol in NADH or 45 kcal/mol in FADH2 to about 0 kcal/mol in water. The end products of the electron transport chain are water and ATP. A number of intermediate compounds of the citric acid cycle can be diverted into the anabolism of other biochemical molecules, such as nonessential amino acids, sugars, and lipids. These same molecules can serve as energy sources for the glucose pathways.

4) Write down the four steps involved in beta oxidation?

Ans Beta oxidation takes place in four steps dehydrogenation, hydration, oxidation and thyolisis

**Dehydrogenation**

In the first step, acyl-CoA is oxidized by the enzyme acyl CoA dehydrogenase. A double bond is formed between the second and third carbons (C2 and C3) of the acyl-CoA chain entering the beta oxidation cycle; the end product of this reaction is trans-Δ2-enoyl-CoA (trans-delta 2-enoyl CoA). This step uses FAD and produces FADH2, which will enter the citric acid cycle and form ATP to be used as energy.

**Hydration**

In the second step, the double bond between C2 and C3 of trans-Δ2-enoyl-CoA is hydrated, forming the end product L-β-hydroxyacyl CoA, which has a [hydroxyl group](https://biologydictionary.net/hydroxyl-group/) (OH) in C2, in place of the double bond. This reaction is catalyzed by another enzyme: enoyl CoA hydratase. This step requires water.

**Oxidation**

In the third step, the hydroxyl group in C2 of L-β-hydroxyacyl CoA is oxidized by NAD+ in a reaction that is catalyzed by 3-hydroxyacyl-CoA dehydrogenase. The end products are β-ketoacyl CoA and NADH + H. NADH will enter the citric acid cycle and produce ATP that will be used as energy.

**Thiolysis**

Finally, in the fourth step, β-ketoacyl CoA is cleaved by a thiol group (SH) of another CoA [molecule](https://biologydictionary.net/molecule/) (CoA-SH). The enzyme that catalyzes this reaction is β-ketothiolase. The cleavage takes place between C2 and C3; therefore, the end products are an acetyl-CoA molecule with the original two first carbons (C1 and C2), and an acyl-CoA chain two carbons shorter than the original acyl-CoA chain that entered the beta oxidation cycle.

5) How uric acid formation takes place in body?

Ans.one of those waste products is uric acid. It’s formed when your body breaks down purines, which are found in some foods, but also show up when cells die and get taken apart. Most of the uric acid leaves your body when you pee, and some when you [poop](https://www.webmd.com/digestive-disorders/rm-quiz-poop)

So if you have high levels of uric acid, it can be a sign of disease such as [gout](https://www.webmd.com/arthritis/arthritis-gout). That’s when you might need a uric acid [blood](https://www.webmd.com/a-to-z-guides/rm-quiz-blood-basics) test, which measures how much uric acid you have in your blood.

You may also hear this test called a serum uric acid test, serum urate

Most of it is excreted (removed from your body) in your urine, or passes through your intestines to regulate "normal" levels.

Normal Uric acid levels are 2.4-6.0 mg/dL (female) and 3.4-7.0 mg/dL (male).