# Description: Iqra National University

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# **Paper Medical Biochemistry II**

# **Semester 2nd**

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**Question no3:**

**Define nucleotide, nucleoside and differentiate between DNA and RNA..?**

**Answer to Question no 3:**

**Nucleotide:**

This type of nucleic acid monomer is composed of a nucleobase, a five carbon sugar, and one or more phosphate group.

**Nucleoside:**

Nucleoside is composed of a simple nucleobase also called nitrogenous base and a five carbon sugar called 2’ deoxyribose.

**DNA:**

Deoxy ribo nuclic acid (DNA) is a double stranded macromolecule uses the base adenine, thymine, cytosine and guanine. Adenine and thymine have double bond and cytosine and guanine have triple bond.

**RNA:**

Ribonuclic acid is comprised of a single strand molecule different from DNA in that it have adenine, guanine, cytosine and uracil.

**Question no 4:**

**Why Dickens and Horecker’s Pathway is called HMP pathway. Enlist the enzymes used in PPP Pathway..?**

**Answer to Question no 4:**

This is the process 0f metabolism of 5.carbon sugar pentose similar to glycolysis the pentose phosphate pathway which is called phosphogluconate pathway and the hexose monophosphate shunt. This process generates NADPH and pentose as well as ribsose 5 phosphates a precursor for the synthesis of nucleotides. While oxidation of glucose is involved in pentose pathway and its role is anabolic rather than catabolic.

**Enzyme name used in oxidative phase**

**a)** Glucose 6 phosphate dehydrogenase

**b)** Six (6) phophogluconate olactonase

**c)** Six (6) phophogluconate dehydrogenase.

**Enzyme name wed in non-oxidative phase of PP. pathway**

1. **Enzyme Isomerise**
2. **Epimerase Enzyme**
3. **Transkctulase Enzyme**

**Question no 5:**

**What is the function of carnitine shuttle system? Write down the stages and steps involved in Beta oxidation of Lipids…?**

**Answer to Question no 5:**

carnitine shuttle system a long chain fatty acid process responsible of transferring long chain fatty acid across the barrier of the inner mitochondrial membrane to gain access to the enzyme of beta oxidation.

Inside the mitochondrial matrix fatty acid are oxidized but the fatty acid to be oxidized come from the cystol.

**STEPS IN BETA OXIDIATION OF LIPIDS**

1. Activation of fatty acid which occur inside the cytoplasm.
2. Transport of fatty acid into mitochondria.
3. Beta oxidation inside the mitochondrial matrix

In mitochondria, the fatty acid undergoes a series of oxidation and hydration reaction, which results in the removal of two carbon group ken the form of acetyl CO.A from the fatty acid chains well as the formation of one NADH and one FADH2.

NADH and FADH2 then enter the electron transport chain to form of 5 ATP.

**Question no 2:**

**Write the reactions that are catalyzed by the following enzymes.**

i. Acyl CoA dehydrogenase ii. Adenosine deaminase iii. Nucleotidase

iv. Gluconolactonase v. Enoyl-CoA hydratase

**Answer to Question no 2:**

**a)** **Acyl CoA dehydrogenase**

This enzyme is used in the last stages of beta oxidation of fatty acid where it catalyze the conversion of I-3-hydroxyacyl CoA to 3-ketoacyl CoA.

**b) Adeninosine deaminase:**

ADA is an enzyme needed in the breakdown of adenosine from food and for the turnover of nucleic acid in tissues. It is involved in the purine metabolism.

**c) Nucleotides:**

This enzyme is used in the phosphorylatic catalyzation. The 5-nucloetidase catalyze the reaction of an AMP nucleotide to denosine nucleoside. It has an important function in digestion in that they breakdown consumed nucleic acid.

1. **Gluconolactonase:**

The two substrate of enzyme are D-glucono-1,5-lactone and water H2O.

D-glucono-1,5-lactone + H2O >>>>> D-gluconate.

This enzyme participates in 3 metabolic pathway, pentose pathway, and caprolactam degradation.

**e) Enoyl Co-A hydratase:**

ECH i.e Enoyl CoA hydratase is an enzyme also called crotonase that hydrates the double bond between the second and third carbon on 2-trans/ cis-Enoyl-CoA.

ECH is essential to metabolizing fatty acids in beta oxidation to produce both Acetyl CoA and energy in the form of ATP.

**Question no 1:**

**Explain the process of “ATP synthesis coupled with electron flow”…?**

**Answer to Question no 1:**

Electron transfer through the respiratory chain releases more than enough free energy to form ATP. H+ is moved by ATP syntheses that were pumped out of the matrix by the electron transport chain back into the matrix. Electron transfer to O2 is tightly coupled to ATP synthesis in mitochondria. the energy from the influx of portion into the matrix is used to generate ATP by the phosphorylation(addition of phosphate) of ADP.

The free energy from the passage of electron through complex I, III, and IV is harvested by being coupled to the synthesis of ATP. Instead the energy derived from the electron transport is coupled to the generation of a proton gradient across the inner mitochondrial membrane.

**IMPORTANCE:**

1. More ATP is generated by FADH2 than NADH.
2. 10 H+ ions are pumped to each NADH in the inner membrane.
3. At last stage the FADH2 enters the chain.

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