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RAD II and DT II

Final term

BIOCHEMISTRY

Marks 50

Write note on following questions each carries equal marks

1) Write down the 4 steps involve in beta oxidation?

Four steps in beta oxidation.

Beta oxidation occurs in the mitochondria of eukaryotic cells and in the cytosol of prokaryotic cells.Beta oxidation is a metabolic process involving multiple steps by which fatty acid molecules are broken down to produce energy. More specifically, beta oxidation consists in breaking down long fatty acids that have been converted to acyl-CoA chains into progressively smaller fatty acyl-CoA chains.

Beta Oxidation Steps

Beta oxidation takes place in four steps: dehydrogenation, hydration, oxidation and thyolisis. Each step is catalyzed by a distinct enzyme.

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 (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 (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.

2) Write down clinical significance of the following enzymes

a) Alkaline phosphatase

Alp is an enzymes found in the liver and bone down protein.Higher then normal levels of ALP May indicate liver damage or disease, such as a blocked bile duct or certain bone diseases.

b) Creatine kinase

Is an enzymes found in the heart,brain,skeleted and different types of other tissues. Increase amount of CK are released into the blood.

When there is muscle demage.This test measures the amount of creatanine kinase in the blood.

c) gamma-glutamyl transferase

The Gamma glutamyl transferase GGT determine The carse of elecrated alkaline phosphate(ALP) Both ALP and are elerated in disease of the ducts and in some liver disease but only ALP will be elerated in bone direct.

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

Electron transport chain.

The electron transport chain is a series of four protein complexes that couple redox reactions, creating an electrochemical gradient that leads to the creation of ATP in a complete system named oxidative phosphorylation. It occurs in mitochondria in both cellular respiration and photosynthesis. In the former, the electrons come from breaking down organic molecules, and energy is released. In the latter, the electrons enter the chain after being excited by light, and the energy released is used to build carbohydrates.

4) Write steps involve in uric acid Formation?

Uric acid is a heterocyclic compound of carbon, nitrogen, oxygen, and hydrogen with the formula $C_5H_4N_4O_3$. It forms ions and salts known as urates and acid urates, such as ammonium acid urate. Uric acid is a product of the metabolic breakdown of purine nucleotides, and it is a normal component of urine.

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

Within cells, xanthine oxidase can exist as xanthine dehydrogenase and xanthine oxireductase, which has also been purified from bovine milk and spleen extracts. Uric acid is released in hypoxic conditions.

Humans.

The normal concentration range of uric acid (or hydrogen urate ion) in human blood is 25 to 80 mg/L for men and 15 to 60 mg/L for women

Normal excretion of uric acid in the urine is 250 to 750 mg per day (concentration of 250 to 750 mg/L if one litre of urine is produced per day –

5) How uric acid formation takes place in body?

Uric acid is a waste product found in blood. It's created when the body breaks down chemicals called purines. Most uric acid dissolves in the blood, passes through the kidneys and leaves the body in urine. Food and drinks high in purines also increase the level of uric acid. These include:

Seafood (especially salmon, shrimp, lobster and sardines)

Red meat

Organ meats like liver

Food and drinks with high fructose corn syrup, and alcohol (especially beer, including non-alcoholic beer)

If too much uric acid stays in the body, a condition called hyperuricemia will occur. Hyperuricemia can cause crystals of uric acid (or urate) to form. These crystals can settle in the joints and cause gout, a form of arthritis that can be very painful. They can also settle in the kidneys and form kidney stones.