NAME: WASIMULLAH

ID: 16109

DEPARTMENT : MLT 1st SEMESTER

SECTION:B

PAPER :Basic biochemistry (theory)

INSTRUCTOR: Sana khaN

Q:(1) Define Dickens and Horeckers Pathway also explain irreversible Phase of HMP Pathway. Enlist The enzymes used in non-oxidative Phase of HMP Pathway.

Ans:: Dickens shunt a Secondary Pathway for the oxidation of d-glucose generating reducing Power in the Cytoplasm outside the mitochondria and Synthesized Pentoses and a few other Sugars.

Synonym: pentose phosphate pathway: Lipmann-Dickens-Horecker Shunt.

IRReversible Phase of HMP Pathway::

steps involed in irreversible pathway

- Glucose-6-phosphate → 6-Phosphogluconate
- 6-Phosphogluconolactone → 6-Phosphogluconate.
- 6-phosphogluconate → Ribulese-5-Phosphate

The "oxidative" word of this phase comes from the process of oxidation. oxidation is the breakdown of a molecules as it loses at least

one of its electrons.

Step 1:

Glucose-6 phosphate is oxidized to form 6-phosphogluconolactone. NADPH is produced as a byproduct of this reaction while the reaction is catalyzed by enzyme known as Glucose-6 phosphate dehydrogenase.

Step 2:

6-Phosphogluconolactons is converted into 6-phosphogluconate in the presence of an enzyme known as 6-Phosphogluconolactone hydrolase.

Step 3:

6-Phosphogluconate in the presence of an enzyme known a 6-phosphogluconate dehydrogenase is converted into Ribose-5-phosphate. NADPH is also produced as a ~~Hy~~ byproduct in this reaction while CO_2 is also formed.

2 Enlist enzymes used in non-oxidative HMP Pathway.

① Isomerase enzyme ② epimerase enzyme
③ Transketolse ④

Q(2) What are the steps and enzymes involved in Glycolysis.

Glycolysis:

Glycolysis is the metabolic process in which glucose is converted into pyruate.

Steps involved in glycolysis:

1. Glucose → Glucose - 6- phosphate
2. G6P → Fructose 6- phosphate (F6P)
3. F6P → Fructose 1.6 - bisphoshate.
4. Fructose 1.6 - bisphosphate → Dihydroxyacetone Phosphate (DHAP) + Glyceraldehyde 3- Phosphate (GAP).
5. DHAP → Glyceraldehyde 3 - phosphate (GAP)
6. Glyceraldehyd 3- phosphate → 1.3 - bisphoglycerate.
7. 1.3 bisphoglycerate → 3. phosphoglycrate.
8. 3phosphoglycrate → 2. phosphoglycerate.
9. 2- phosphoglycerate → phosphoenolpyrivic
10. phosphoenolpyruvate (PEP) → pyruvic acid.

Enzymes involved in Glycolysis:

step 1: Hexokinase
step 2: Phosphoglucose Isomerase.
step 3: Phosphofructokinase
step 4: Aldolase
step 5: Triose phosphate isomerase
step 6: Glyceraldehyde 3-phosphate Dehydrogenase.
step 7: Phosphoglycerate kinase
step 8: Phosphoglycerate Mutase.
step 9: Enolase
step 10: Pyruvat kinase.

Q(3) Discuss digestion and absorption of carbohydrates:.

- The digetion of carbohydrates begins in the mouth. the silivary gland enzyme amylase begins the breakdown of food starches into maltose, a disaccharide.
- As the food travels through the esophagus to the stomach. no significant digestion of carbohydrates takes place. the esophagus no digestive enzymes but does produce mucous for lubrication.
- the acidic environment in the stomach stops the action of the amylase enzyme.
- the next steps of carbohydrates digestion takes place in the duedenum. the food from the stomach enters the deudenum and mixes with digestive ~~sect~~ secretion from the pancreas. liver, and gallbladder.

- Pancreatic Juice also contain amylase, which continues the breakdown of starch and glycogen into maltose, a disaccharide.
- the disaccharides are broken down into monosaccharides by enzymes called maltose, Sucrases, and lactases. which are present in the small intestinal wall.
- Maltase breaks down maltose into glucose: other disaccharides, Such as Soucrose and lactose are broken down by Sucrase and lactase respectively.
- Sucrase breaks down sucrose into glucose and fructose, and lactase breaks down lactose into glucose and galactose.
- the monosaccharides thus produced are absorbed and then can be used in metabolic pathway to produce energy. the monosaccharides are transported into the blood streaqm to be transported to the different cell in the body.

Q(4) Explain step by step the Tricarboxylic acid cycle:

Tricarboxylic Acid cycle:

The pyruate molecule generated during glycolysis are Transported across the mitochondrial membrane into the inner mitochondrial matrix, where they are metabolized by enzyne in a pathway called Tricarboxylic cycle. and also commoly called the krebs cycle and citric acid cycle.

During the krebs cycle high energy molecules, including ATP, NADH, and FADH2, are created.

Steps in the krebs cycle.

= step 1: Formation of krebs cycle,
the first step is a condensation step. combining the two-carbon acetyl group with a four-carbon oxaloacetate molecule to form a six-carbon molecules of krebs.

= Step 2: conversion of ~~krebs~~ citric acid cycle to Isocitrate
Citrate is converted luto Isocitrate by the enzyme aconitase. this is

This is accomplished by the removal and addition of water to yield an isomer.

- Steps 3. Oxidation of Isocitratic Acid to α-Ketoglutaric acid.

In step three, isocitrate is oxidized. producing a five-carbon molecules α ketoglutrate. together with a molecule of CO_2 and Two electrons. which reduce NAD^+ To NADH.

- step 5. Conversion of Succinyl-CoA to Succinic Acid.

Succinyl-CoA is converted into Succinic acid along with formation of ATP and CoA by the Action of Succinyl-CoA Synthetase enzyme.

- step 6. Conversion of Succinate to fumarate.

In this step succinate is converted into fumarate. Two hydrogen atoms are transferred to FAD, producing $FADH_2$.

Step 7. Formation of Malate.
water is added to fumarat during step seven, and malate is produced.

Step 8.. Formation of Oxaloacetate.
the last step in the citric Acid cycle regenerates oxaloacetate by oxidizing malate. Another molecule of NADH is produced.

Q(5) Differentiate between fat and oil and also explain "solid fat is beneficial for health or oil."

Fat: are Substances that help the body use Some vitamins and Keep the skin healthy: they are also the main way the body store energy.

oil is a non poler chemical Substance that is a various liquid at ambient Temperatures and is both hydrophic and lipophilic.

Fats	oil
① Fats are usually derived from animals.	oils are usually derived from plants.
② Fats Tends to be Solids at room Temperature.	oils Tend To be liquid at Room Temperature.
③ Fats are Saturated	oils is unsaturated
④ Fats have NO double bond	oils have double bond
⑤ Fats melting point is high	oils melting point low
⑥ Fats more stable	oils less stable

(11)

=> Solid fats and oils provide The Same number of calories per gram. However, oils are generally better for your health then Solid fats because they contain less saturated fats and or Trans fats.