UNIT - II

## ① Glycolysis.

Glycolysis is defined as the sequence of reactions converting glucose (or glycogen) to pyruvate or lactate, with the production of ATP.

## ② Gluconeogenesis.

The synthesis of glucose from non-carbohydrate compounds is known as gluconeogenesis. The major substrates / precursors for gluconeogenesis are lactate, pyruvate, glucogenic amino acids, propionate and glycerol.

## ③ Glycogenesis.

The synthesis of glycogen from glucose is glycogenesis. Glycogenesis takes place in the cytosol & requires ATP & UTP, besides glucose.

## ④ Glycogenolysis.

The degradation of stored glycogen in liver and muscle constitutes glycogenolysis. The pathways for the synthesis and degradation of glycogen are not reversible. An independent set of enzymes present in the cytosol carry out glycogenolysis.

Glycogen is degraded by breaking $\alpha$-1,4 & $\alpha$-1,6 Glycosidic bonds.

(5) **Hexose Monophosphate Shunt (HMP).**

Hexose Monophosphate pathway or HMP shunt is also called as pentose phasphate pathway or phosphogluconate pathway. This is an alternative pathway to glycolysis and TCA cycle for the oxidation of glucose. However, HMP shunt is more anabolic in nature, since it is concerned with the biosynthesis of NADPH and pentose.

(6) **Citric acid cycle.**

* The citric acid cycle (Krebs cycle (or) tricarboxylic acid - TCA cycle) is the most important metabolic Pathway for the energy supply to the Body.

* About 65-70% of the ATP is synthesized in Krebs cycle.

* Citric acid cycle essentially involves the oxidation of acetyl CoA to $CO_2$ and $H_2O$.

(7) **Other name of glycolysis cycle & citric acid cycle.**

Glycolysis - Embden - Meyerhof pathway (E.M pathway).

Citric acid cycle →
- Krebs cycle.
- Tricarboxylic acid cycle (TCA).

## ⑧ Energetics of Tricarboxylic acid cycle.

Citric acid cycle produce,

* 3 NADH
* 1 FADH$_2$
* 1 GTP(ATP)
* 2 $CO_2$.

3 NADH → 3 × 2.5 = 7.5 ATP
1 FADH$_2$ → 1 × 1.5 = 1.5 ATP.
1 GTP(ATP) → = 1.0 ATP

10.0 ATP

1 Acetate → 10 ATP
2 Acetate → 20 ATP //

## ⑨ Glycosuria.

The commonest cause of glucose excretion in urine (glycosuria).

Glycosuria is the first line screening test for, diabetic Mellitus.

(10) Functions of Insulin.

- Insulin helps control blood glucose level by signaling the liver & muscle & fat cell to take in glucose from the blood.
- Insulin therefore helps cells to take in glucose to be used for energy.
- If the body has sufficient energy, Insulin signals the liver to take up glucose and store it as glycogen.