

METABOLISM**Glycolysis & TCA cycle**➤ **Metabolism**

- **Metabolism** is the set of life-sustaining chemical reactions in organisms.
- The three main functions of metabolism are:
 - i) The conversion of the energy in food to energy available to run cellular processes
 - ii) The conversion of food to building blocks for proteins, lipids, nucleic acids, and some carbohydrates
 - iii) The elimination of metabolic wastes

➤ **Respiration**

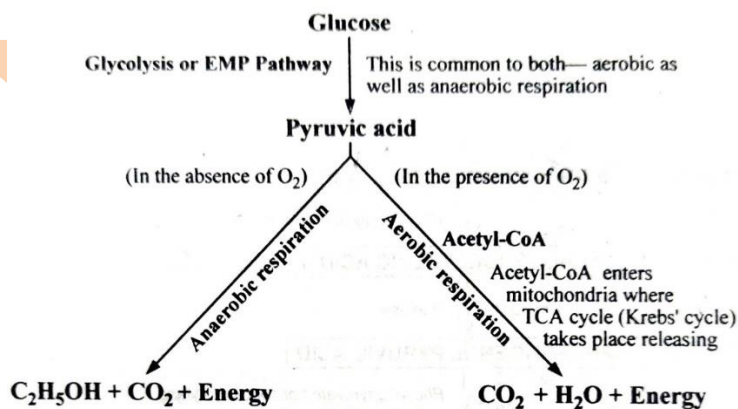
- Respiration is primarily a cellular energy yielding process and the phenomenon exhibited by all living organisms. In this process high energy containing substance generally carbohydrate proteins or lipids are broken down in stepwise manner, under enzymatic control, into simpler substances of lower energy content. Energy is liberated at certain specific stages and trapped in ADP and stored in pyrophosphate bonds of ATP. Respiration is usually represented by the following equation



- Respiration may be either aerobic or anaerobic

➤ **Mechanism of respiration**

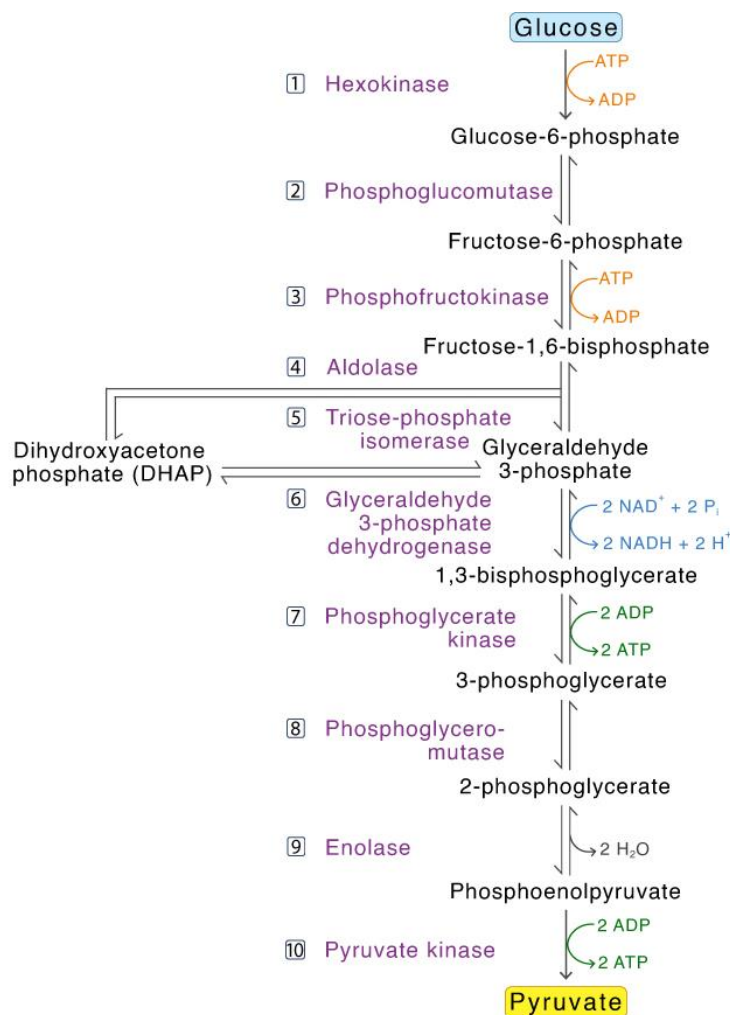
- The respiration is starts with glucose usually.
- In aerobic and an aerobic respiration initial reactions are common as a result of which pyruvic acid is formed by breakdown of glucose. The process is called glycolysis or EMP pathway. This process does not require O₂. After this stage the fate of pyruvic acid is different depending upon the absence or presence of oxygen.
- If oxygen is present there is complete oxidation of pyruvic acid into H₂O and CO₂ and chemical reactions through which this occur is called tricarboxylic acid cycle(TCA cycle or Krebs cycle). This cycle occurs in mitochondria.
- If oxygen is absent pyruvic acid form ethyl alcohol and CO₂ without the help of any cell organelle. This process is called an aerobic respiration



Scheme representing interrelationship between aerobic and anaerobic respiration

1. Step-1 Glycolysis or Embden Meyerhof Parnas pathway (EMP pathway)

- In this process each molecule of glucose is broken down in stepwise biochemical reactions under enzymatic control into two molecules of pyruvic acid.
- All these reactions take place in cytoplasm.
- Starch or other stored carbohydrates are converted to glucose before their utilization in this process



2. Step-2 Tricarboxylic acid cycle (TCA)

- It was given by Hans Krebs in 1931
- Acetyl CoA produced by pyruvic acid enters into krebs cycle
- This cycle take place in mitochondria

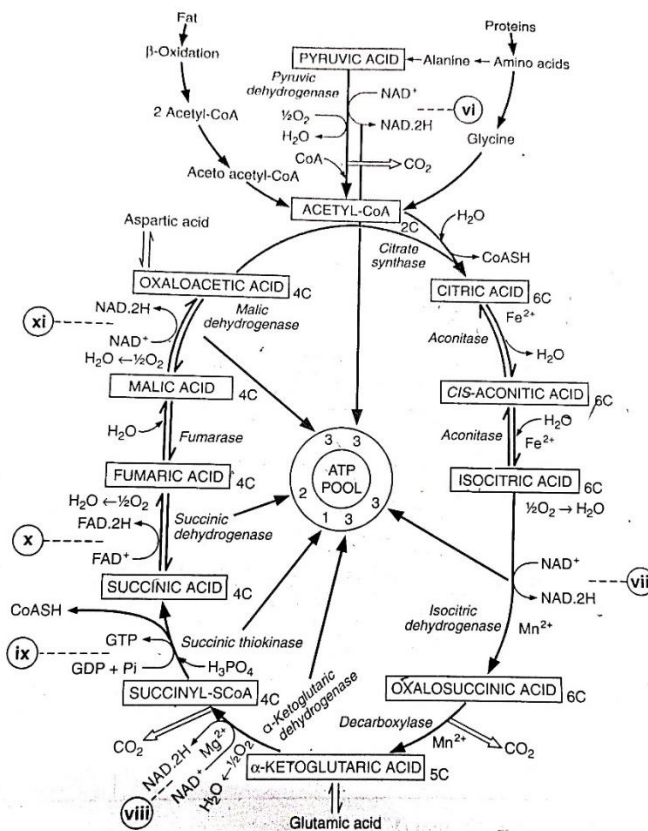


Fig. 45.6 Diagrammatic representation of oxidative decarboxylation of pyruvic acid and different chemical reactions in Krebs Cycle starting from Acetyl CoA (GDP-Guanine Diphosphate, GTP-Guanine Triphosphate, FAD-Flavin Adenine Dinucleotide) It is a coenzyme

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