

Introduction

Carbohydrate metabolism is a fundamental biochemical process that ensures a constant supply of energy to the living cells. It is the central metabolic pathway associated with the formation and breakdown of carbohydrates with energy generation.

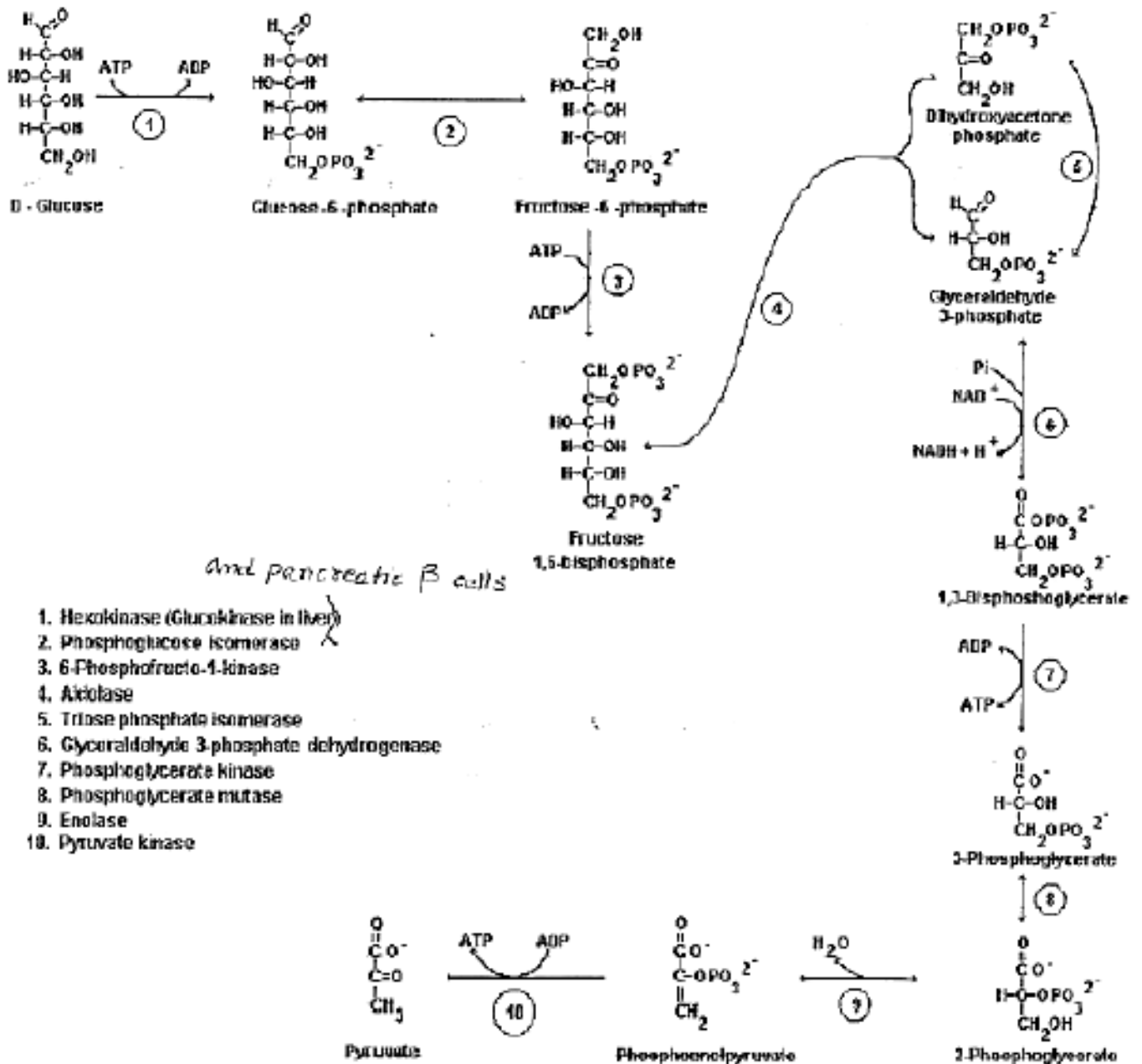
The most important carbohydrate is **glucose**, which is broken down via glycolysis, enter into the Krebs's cycle and oxidative phosphorylation to generate **ATP**.

1. Catabolism**1.1. Glycolysis**

- Glycolysis is central metabolic reactions converting **glucose** (or glycogen) to **pyruvate** or **lactate**, with the production of energy in form of **ATP**.
- Glycolysis takes place in cytosol of all the cells of the body. It is the major pathway for ATP synthesis in tissues lacking mitochondria.
- **Lactate** is the end product in anaerobic condition, whereas **Pyruvate** is the end product in aerobic condition, which is finally oxidize to form CO_2 and H_2O and releases ATP.

 Glycolysis reactions steps

Glycolysis consists of two phases. In the first phase, glucose is broken down to two molecules of glyceraldehyde-3-phosphate in a series of five reactions. In the second phase, another series of five reactions convert these two molecules of glyceraldehyde-3-phosphate into two molecules of pyruvate. Phase I consumes 2 ATP and Phase II generates 4 ATP. The net ATP production in the entire process is 2.

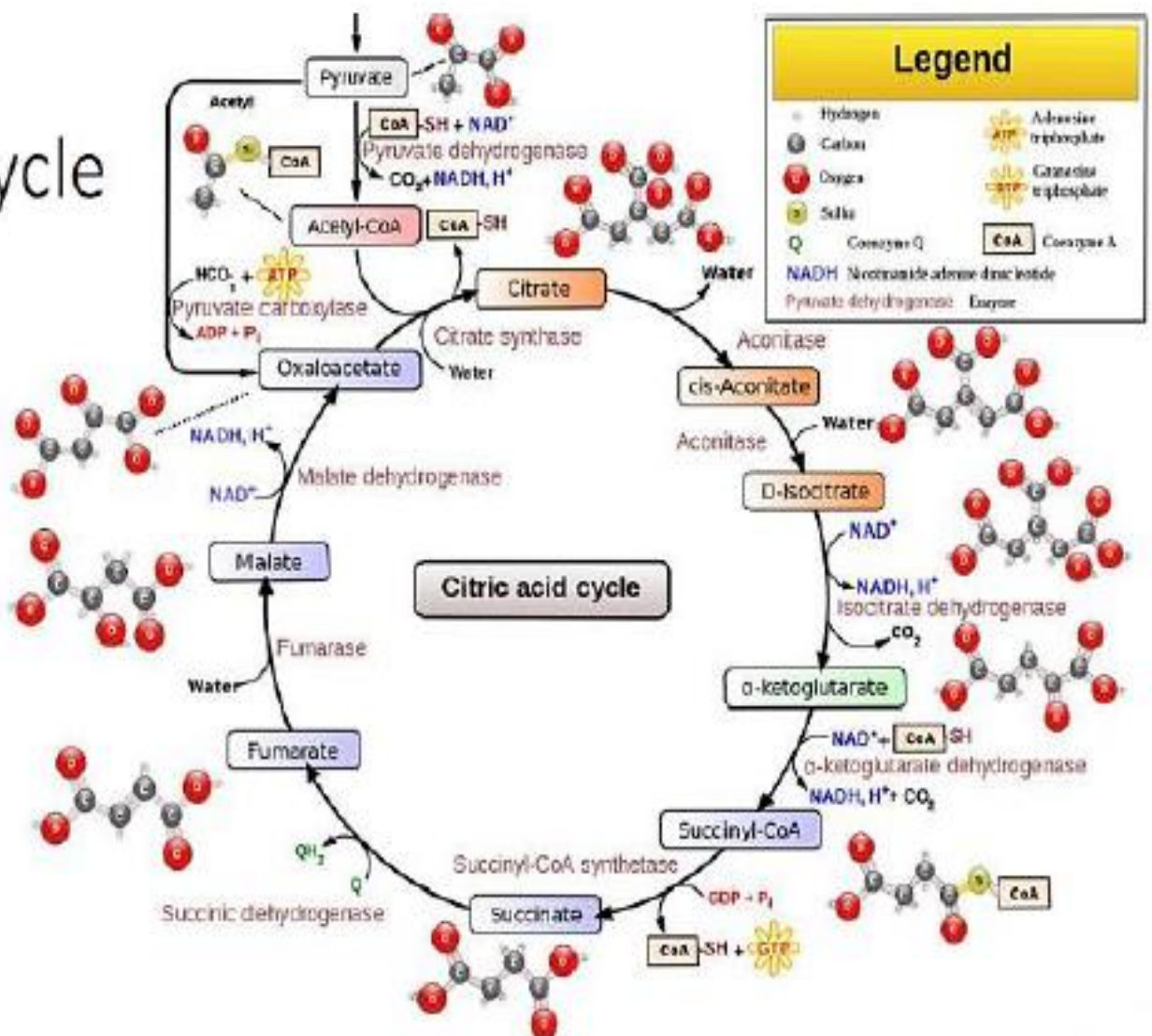


Glycolysis steps

1.2.Krebs cycle

- The Krebs Cycle has a total of 8 metabolic reactions involved in the full oxidation of our food molecules into carbon dioxide.
- 8 major reactions occur in the Krebs Cycle.
- It is a metabolic cycle because it regenerates the same metabolite at the end that you start with. The eight reactions of the citric acid cycle use a small molecule (oxaloacetate) as the starting place for the reaction cycle. The cycle starts by addition of an acetyl group to oxaloacetate, then, in eight steps, the acetyl group is completely broken apart, restoring the oxaloacetate molecule for another round.

Krebs Cycle



1.3.Glycogenolysis

1.4.Pentose phosphate pathway

2. Anabolism

2.1.Gluconeogenesis

2.2.Glycogenesis