



AL-MUSTAQBAL UNIVERSITY COLLEGE

Department of Biomedical Engineering

Biochemistry

(Carbohydrate metabolism)



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Metabolism:

It is a group of chemical reactions that occur in living organisms on substances Differing food by enzymatic factors for the purpose of obtaining energy or Tissue structure metabolism is divided into:

1-Catabolism

2-Anabolism

1-Catabolism Where the main nutrients are broken down, whether carbohydrates, proteins or lipids through various methods of biological reactions into simple molecules and the result is get energy.

2-Anabolism The simple molecules produced from the demolition process can be used as nuclei to build more materials complex, whether proteins or nucleic acids, through a series of reactions It builds tissues and uses energy in those reactions.

Metabolic function.

These are concentrated Use these molecules to build cells and tissues, or divide them and use them as a source of energy. These chemicals can combine to form polymers such as DNA and proteins

Chemical composition of living organisms:

The gradation of living organisms in their composition is known as the principle of the structural sequence of living organisms Or, as slandered. The principle of compositional sequence or organization can be summarized As follows:

Atoms → molecules → cells → tissues → organs → systems → body

metabolic processes

It is the sum total of all the enzymatic reactions that occur in the cell

Specific functions of vital processes:

1. Extracting chemical energy from organic foods or sunlight
2. Converting nutrients from the ocean into primary building materials for the large molecules that make up cells
3. Synthesis of building materials for proteins, amino acids, fats, polysaccharides and components

The other distinct in the cell

4. The formation or destruction of these vital molecules that are necessary for a specific function in the cells

Metabolic processes consist of two networks:

- a. A network that works to produce chemical energy (ATP) from the decomposition of fuel molecules or from sunlight
- b. A network of chemical energy harnessing ATP for the purpose of making new cellular components

Carbohydrates

The most important source of energy needed by the body to carry out the mechanical, chemical, osmotic and electrical activities of various tissues. There are three pathways through which cells obtain large amounts of energy:

1- glycolysis of glucose or the Embden-Mayrhopf pathway.

2-Krebs cycle or citric acid cycle.

3-The pentose phosphate pathway, also called the hexa-monophosphate ext.

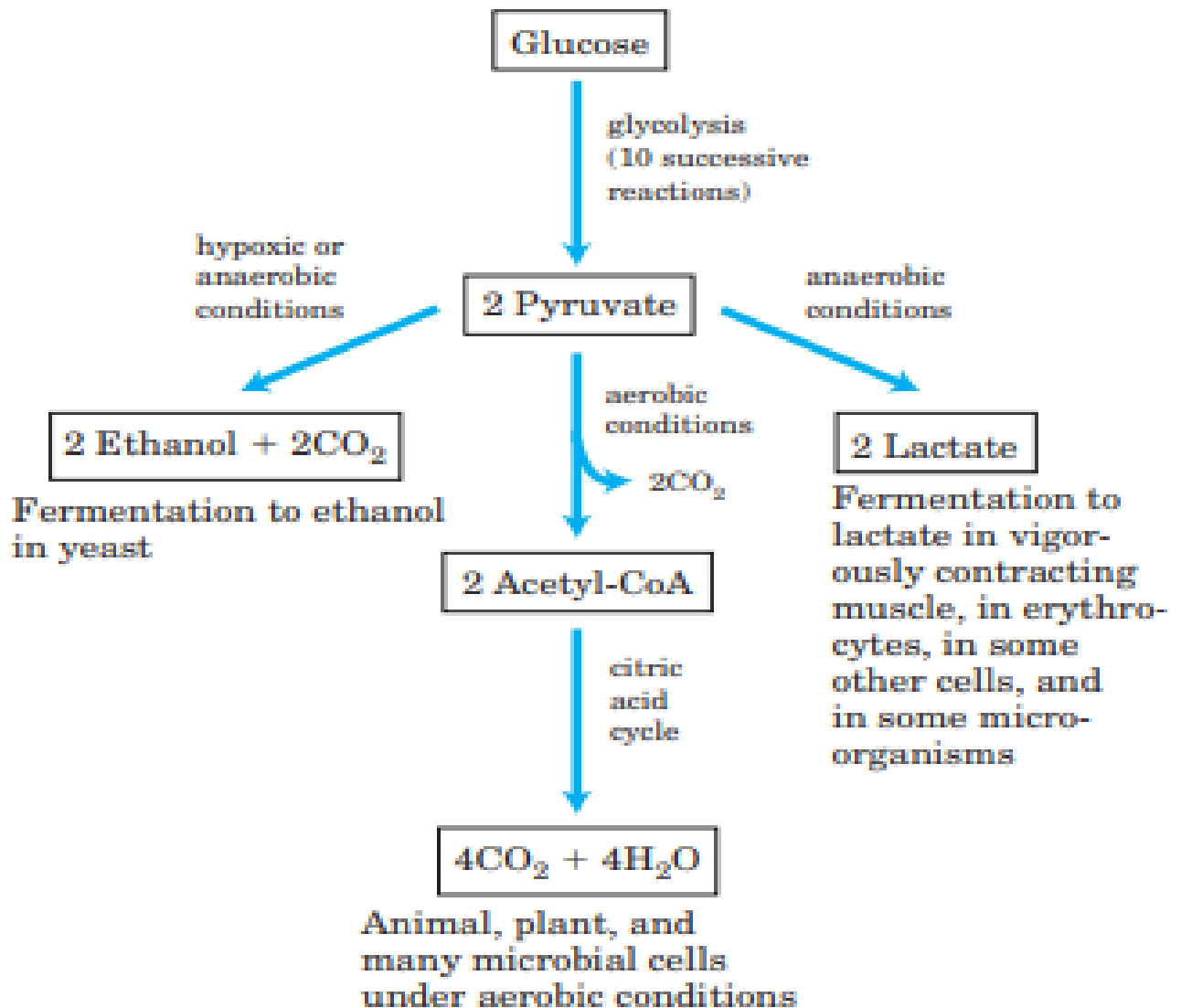
In these three pathways, glucose is considered the starting point, as it represents the most important monosaccharides that are also included in carbohydrates in mammals.

1-Glycolysis:

It is the process by which an organism breaks down glucose and converts it into pyruvate to acetyl-CoA

1. Lactic acid in the absence of O_2 in higher organisms, either in yeasts and fungi It is converted into ethanol and is called fermentation.

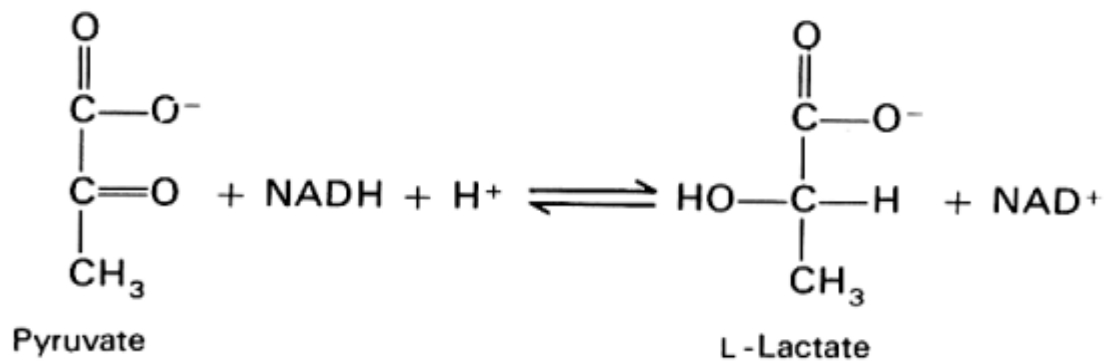
2. Acetyl-CoA in the presence of O_2



Glycolysis in the absence of O₂:

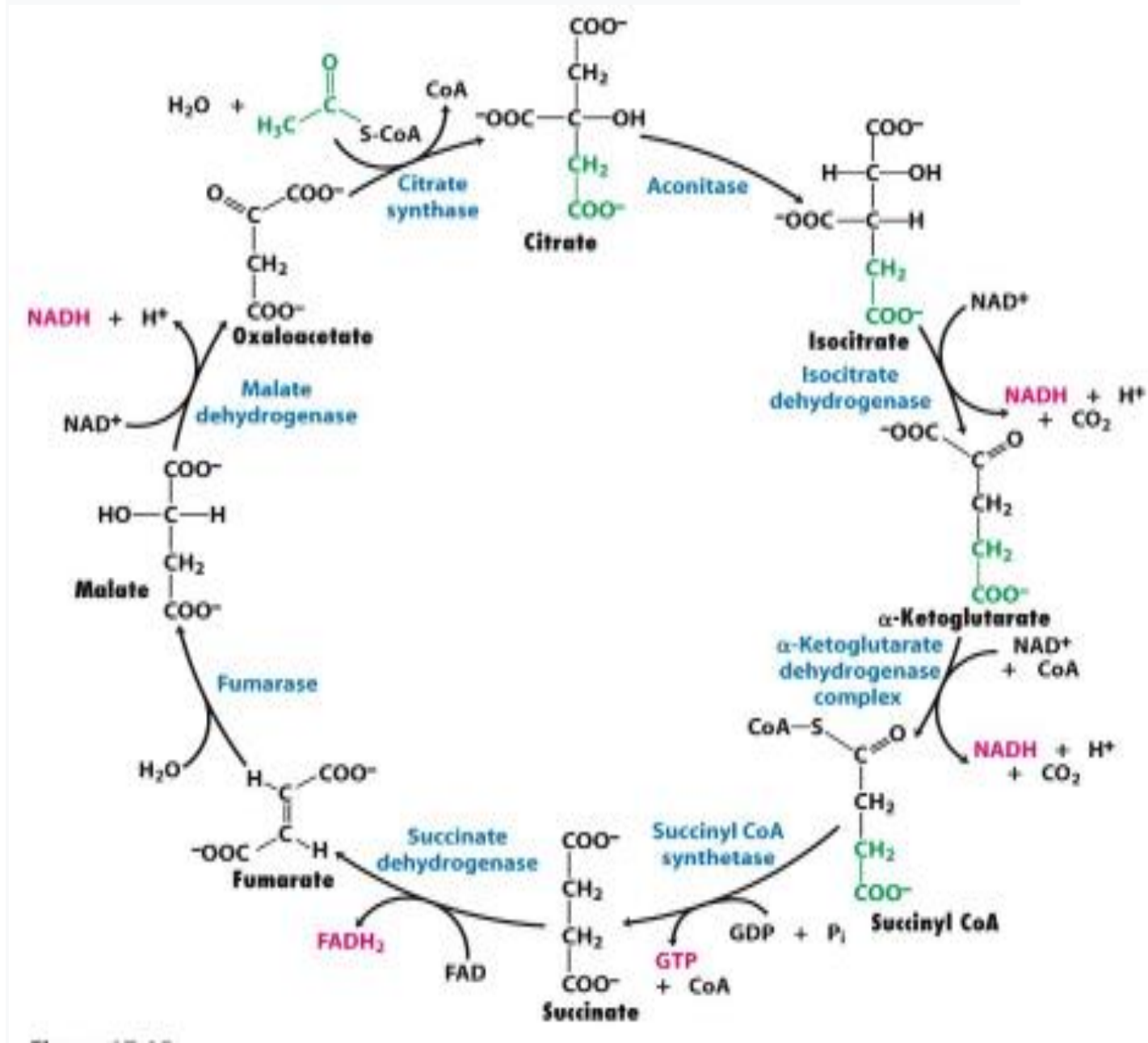
In higher organisms: pyruvate is reduced to lactate, accompanied by oxidation of NADH to NAD

It is made with the help of the enzyme lactate dehydrogenase



2- The Krebs cycle

It is a series of chemical reactions catalyzed by enzymes that have an important and key role in all types of living cells that use oxygen in cellular respiration. The Krebs cycle is known in all scientific circles as the citric acid cycle, and it is called by many names such as the citric acid cycle, The TCA cycle



3- The pentose phosphate pathway

is the main source of NADPH required for anabolic processes, there are three distinct phases each with a distinct result, depending on the needs of the organism, metabolites of that result can be fed into many other pathways. Gluconeogenesis is directly related to the pentose phosphate pathway, with an increase in the need for glucose-6-phosphate, the first metabolite in the pentose phosphate pathway, the activity of gluconeogenesis increases.