

BIOCHEMISTRY- BP203T

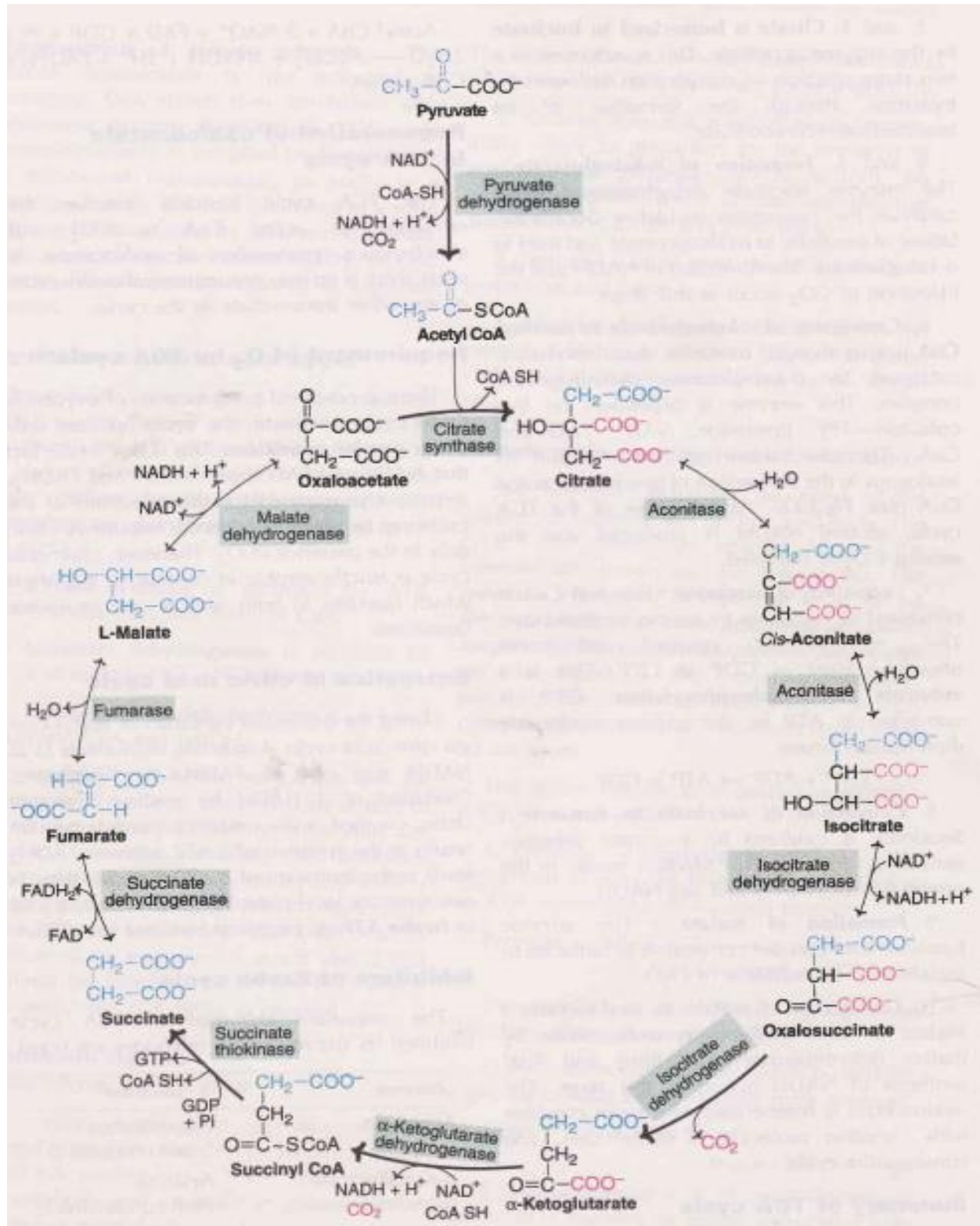
UNIT: 1(METABOLISM OF CARBHOHYDRATES)

CLASS:3

TOPIC: CITRIC ACID CYCLE

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 the Krebs cycle.
- The citric acid cycle essentially involves the oxidation of acetyl-CoA to CO₂ and H₂O. This cycle utilizes about two-thirds of the total oxygen consumed by the body.
- The name TCA cycle is used since, at the outset of the cycle, tricarboxylic acids (citrate, cis-aconitate, and iso-citrate) participate.



REACTIONS OF CITRIC ACID CYCLE :

- Oxidative decarboxylation of pyruvate to acetyl-CoA by the pyruvate dehydrogenase complex.
- This step is a connecting link between glycolysis and the TCA cycle.
 1. Formation of Citrate
 2. Citrate is isomerized to iso-citrate
 3. Isocitrate formation
 4. Formation of α -keto glutarate
 5. Conversion of α -keto glutarate to succinyl-CoA
 6. Formation of succinate
 7. Conversion of succinate to fumarate
 8. Formation of malate
 9. Conversion of malate to oxaloacetate

SIGNIFICANCE OF KREBS CYCLE:

- Krebs cycle or Citric acid cycle is the final pathway of oxidation of glucose, fats, and amino acids
- Many animals are dependent on nutrients other than glucose as an energy source
- Amino acids (metabolic products of proteins) are deaminated and converted to pyruvate and other intermediates of the Krebs cycle. They enter the cycle and get metabolized.
- e.g., alanine is converted to pyruvate, glutamate to α -ketoglutarate, aspartate to oxaloacetate on deamination
- Fatty acids undergo β -oxidation to form acetyl-CoA, which enters the Krebs cycle

- It is the major source of ATP production in the cells. A large amount of energy is produced after the complete oxidation of nutrients
- It plays an important role in gluconeogenesis and lipogenesis, and the interconversion of amino acids
- Many intermediate compounds are used in the synthesis of amino acids, nucleotides, cytochromes, and chlorophylls etc.
- Vitamins play an important role in the citric acid cycle. Riboflavin, niacin, thiamin, and pantothenic acid as a part of various enzymes cofactors (FAD, NAD) and coenzyme A
- Regulation of the Krebs cycle depends on the supply of NAD^+ and the utilization of ATP in physical and chemical work
- The genetic defects of the Krebs cycle enzymes are associated with neural damage.