TCA CYCLE

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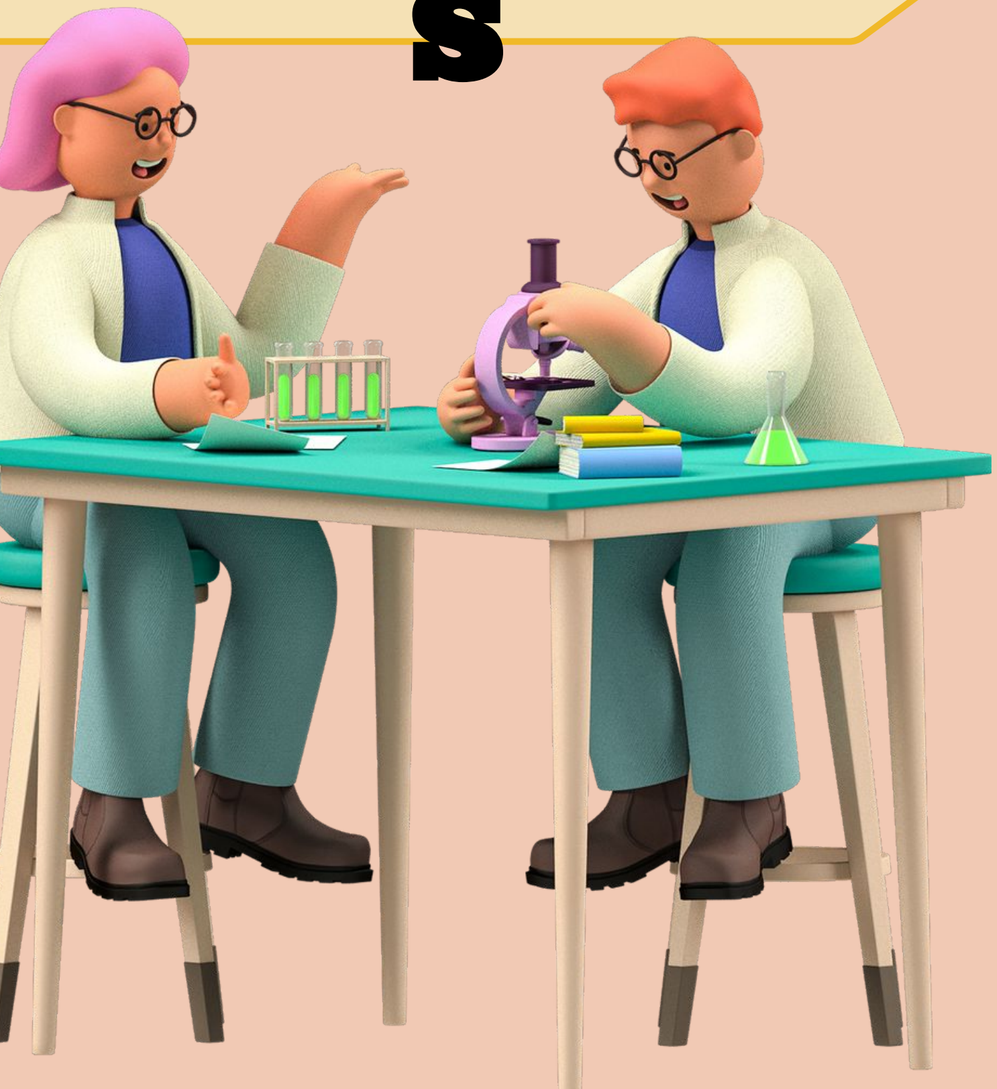
OBJECTIVES



1. Introduction
2. Define the TCA CYCLE
3. Describe the function of TCA CYCLE
4. Describe the mechanism of TCA cycle
5. List Biomedical importance of TCA cycle
6. Summary
7. Reference

INTROUDCTION!

HANS ADOLF KREBS

- ✓ **The citric acid cycle was discovered by Hans Kreb's in 1937 and was also called tricarboxylic acid (TCA) cycle.**
- ✓ **Kreb's received the Nobel prize in physiology or medicine in 1953 for his discovery.**
- ✓ **The TCA cycle Occupies a central position in metabolism and meet most of cell energy Requirement by complete oxidation of acetyl- Co A a key product in the catabolism of Carbohydrates, Fatty acid and amino acid to carbon dioxide and chemical energy in the form of _guanosine-triphosphate)GTP**

DEFINE TCA CYCLE

- The tricarboxylic acid cycle (TCA CYCLE) is a series of enzyme catalyzed chemical reactions that form a key part of aerobic respiration in cells.
- In addition, the cycle provides precursors of Certain amino acids as well as the reducing agent NADH that is used in biochemical Reactions. numerous other reaction
- The cycle consumes acetate(in the form of acetyl-CoA) and water, reduces NAD± to NADH and produces Co_2 as a waste by product. The NADH generated by the TCA cycle is fed into the oxidative phosphorylation (electron transport) pathway.
- In eukaryotic cells, the citric acid cycle occurs in the matrix of the mitochondrion

FUNCTION OF CTA CYCLE

1.ENERGY PRODUCTION

It helps produce energy in cells by converting glucose into

ATP, which is the primary fuel for cells

2.PRODUCTION OF ESSENTIEL COMPOUND

. By understanding the biological pathways and molecular mechanisms that lead to diseases, researchers can design drugs and treatments that specifically target these pathways, making them more effective.

3.Detoxification

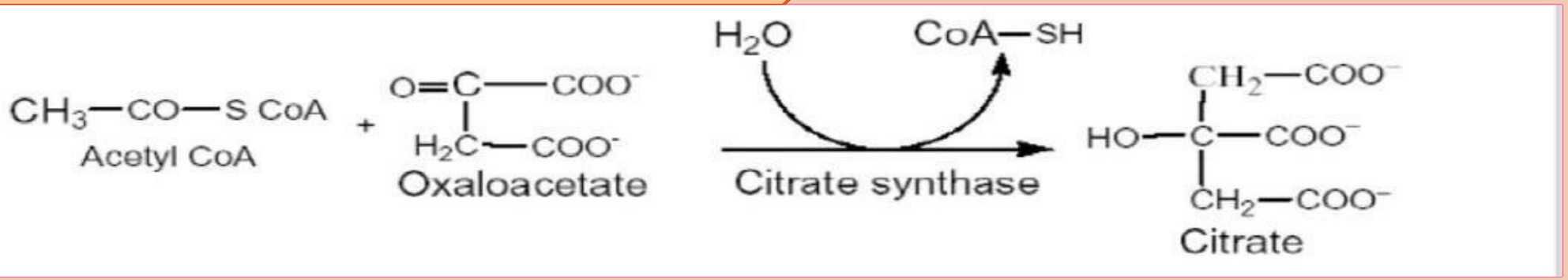
.The cycle aids in eliminating harmful substances produced during metabolism

4.Supporting cellular respiration

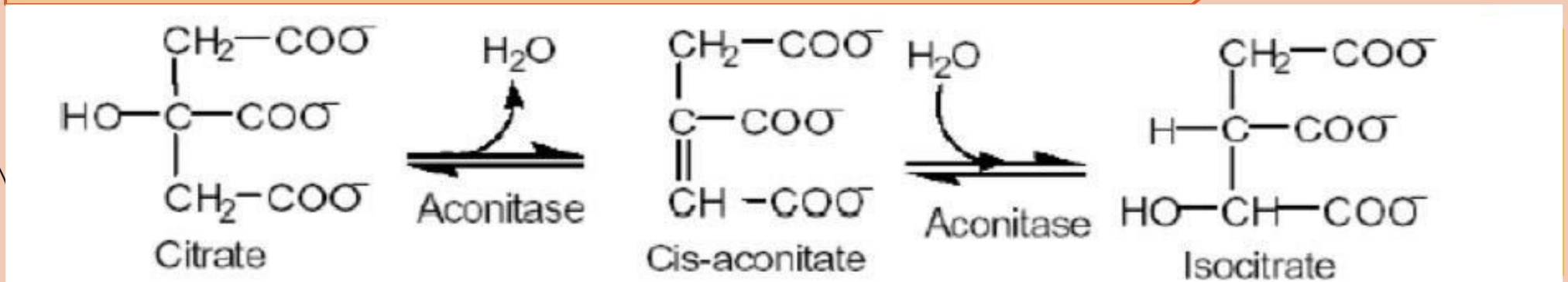
.It is a part of cellular respiration, which relies on oxygen to produce energy.

MECHANISM OF CTA CYCLE

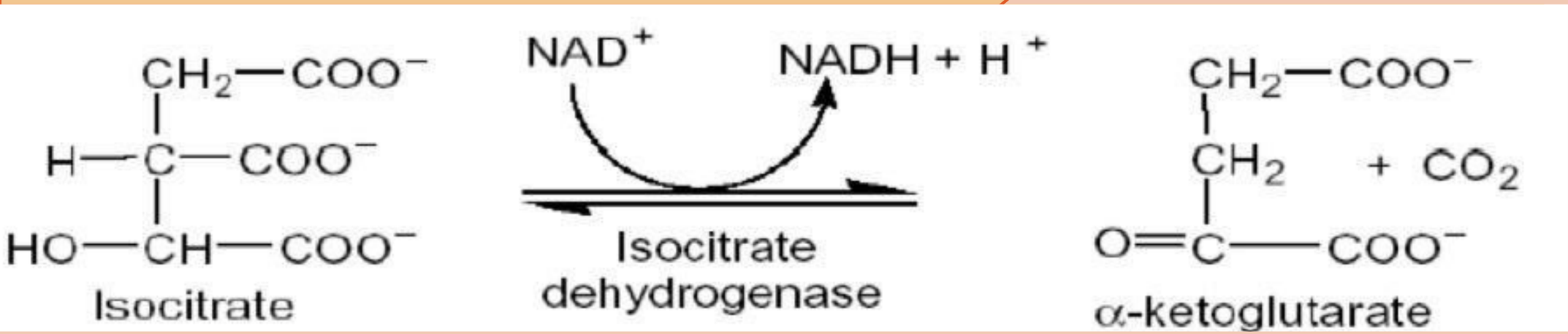
1.FORMATION OF CIRATE



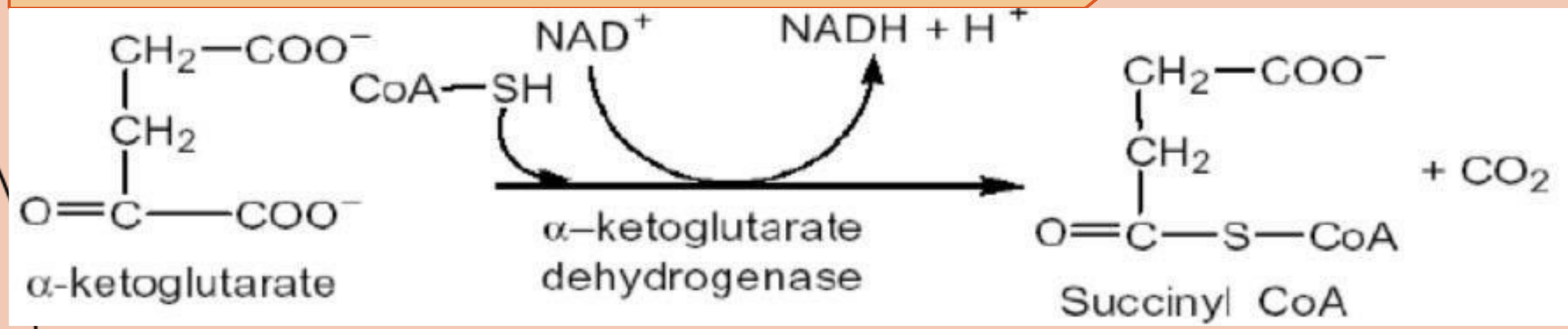
2.CONVERSION OF CIRTRATE TO ISOCITRATE



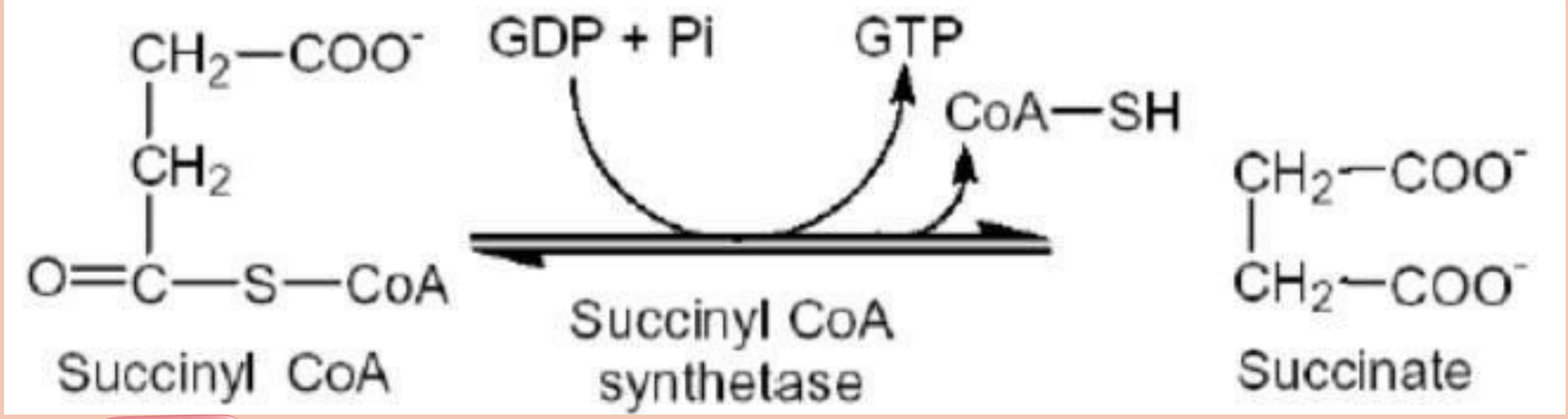
3.OXIDATIVE DECARBOXYLATION



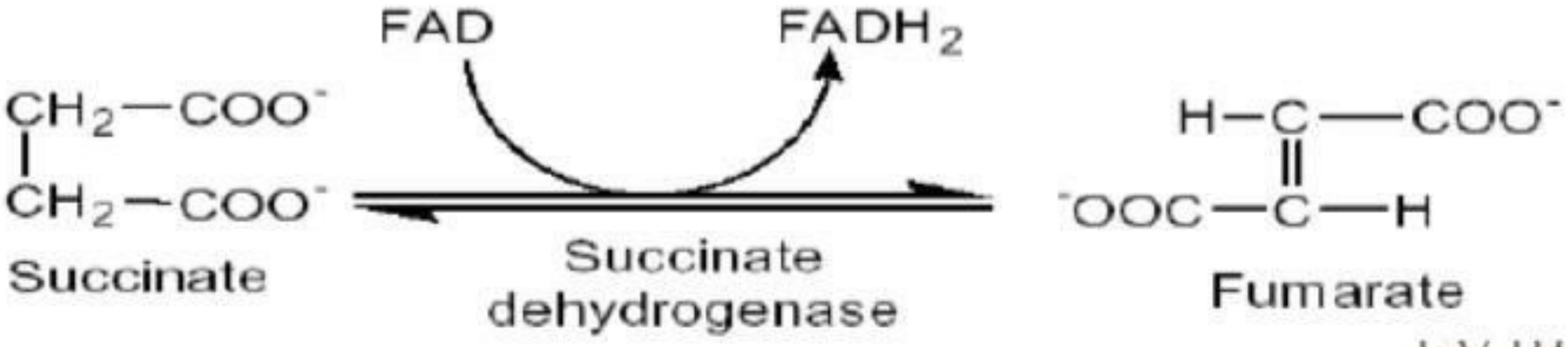
4.CONVERSION OF ALPHA



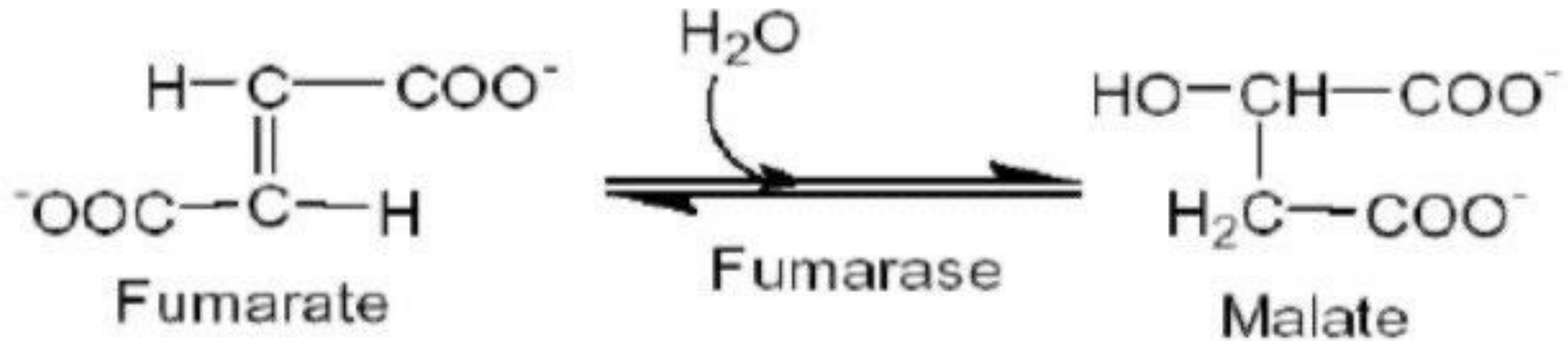
5.CONVERSION OF SUCCINYL-COA TO SUCCINATE



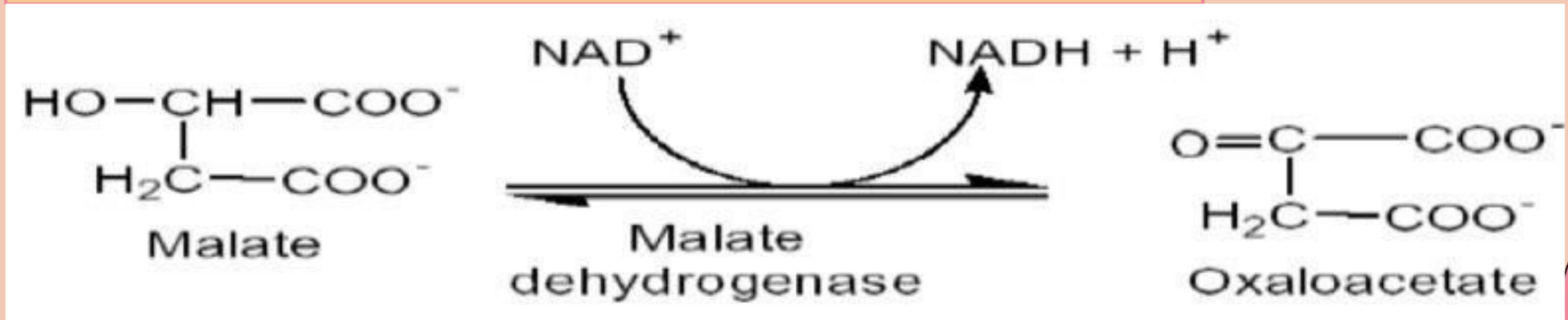
6.CONVERSION OF SUCCINATE TO FUMARATE



7.CONERSION OF FUMARATE TO MALAT



8.CONVERSION OF MALATE TO OXALOACATAE



BIOMEDICAL IMPORTANCE OF CTA CYCLE

1.ANABOLIC:

-Citrate in cytosol by ATP-citrate lyase gives Acetyl-CoA which is use for synthesis of fatty acid and cholesterol.

-Transamination a-Ketoglutarate converted to glutamate and oxaloacetate is converted to aspartate.

-Oxaloacetate in cytosol converted to PEP which is converted to glucose in glucogenesis.

-Succinyl CoA used for heme synthesis, oxidation of ketone body and detoxification.

CO_2 produced is used in CO_2 fixation, purines and pyrimidine and urea synthesis and synthesis of $H_2CO_3HCO_3$- buffer system

2.CATABOLIC:

-The tricarboxylic acid cycle plays several roles in metabolism.

-It is the final pathway where the oxidative metabolism of carbohydrates, amino acids, and fatty acids converge, this oxidation provides energy for the production of the majority of ATP, the cycle occurs totally in the mitochondria.

-Because it functions in both oxidative and synthetic processes, it is amphibolic.

SUMMARY:

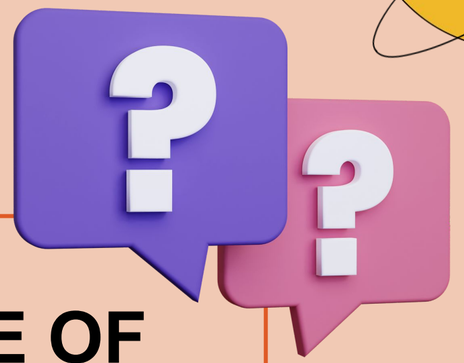
The citric acid cycle, or Krebs cycle, was discovered in 1937 by Hans Krebs, and it plays a crucial role in cellular energy production by oxidizing acetyl-CoA. This cycle occurs in the mitochondria and generates energy in the form of GTP, along with electron carriers like NADH and FADH2, which are later used in the electron transport chain to produce ATP. In addition to energy production, the cycle provides intermediates for the synthesis of amino acids and nucleotides, and it helps regulate various metabolic processes.

QUESTION

HOW MANY ATP YIELD FROM TCA CYCLE?

ANSWER

12 ATP



QUESTION

HOW MANY ATP YIELD FROM ON MOLECULE OF GLUCOSE?

ANSWER

36

REFERENCE:

1.DeLong, L. (2013) Basic pathology, General and Oral Pathology for the Dental Hygienist.

2.https://www.wyzant.com/resources/lessons/science/biology/krebs-cycle/

THANKS