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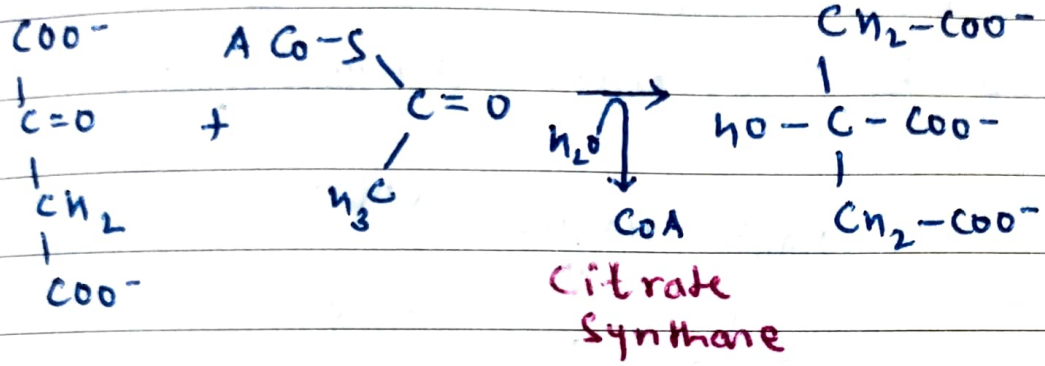
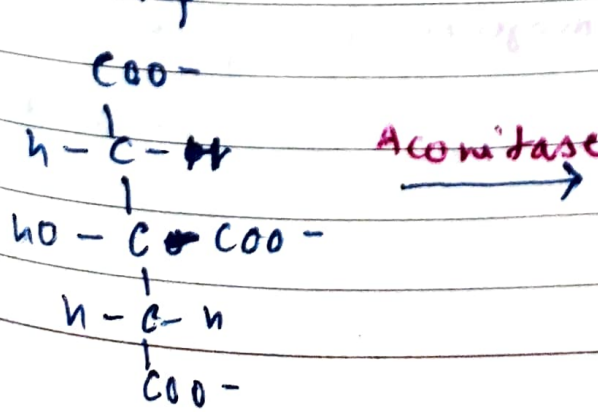


The binding of OAA converts the open form of the enzyme into a closed form. This conformational transition is reminiscent of the cleft closure in hexokinase induced by the binding of glucose. CoA leaves the enzyme, followed by citrate, and the enzyme returns to the initial open conformation.

Citrate is isomerized into isocitrate to enable the six carbon unit to undergo oxidative decarboxylation. The enzyme Aconitase catalyzing this step.

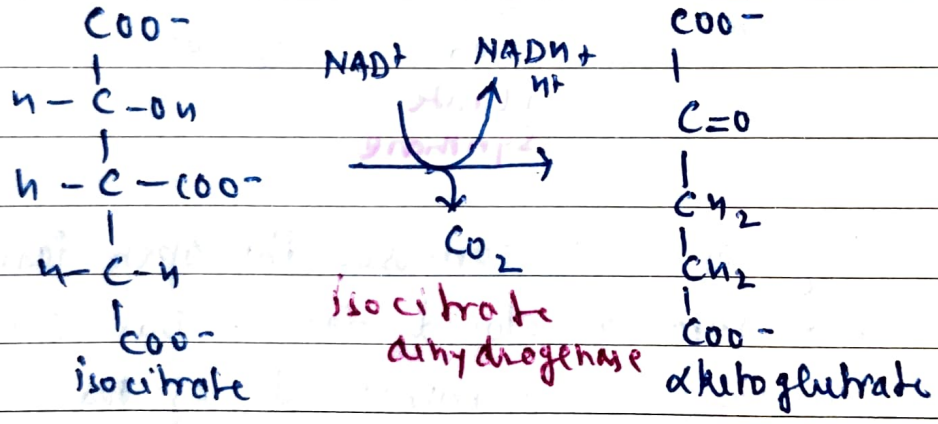


2014

31 FRIDAY JANUARY

Aconitase is an Fe-S protein or nonheme-iron protein. The Fe-S cluster participate in dehydration and rehydrating the bound substrate.

The oxidative decarboxylation of isocitrate is catalyzed by <u>isocitrate dehydrogenase</u>.



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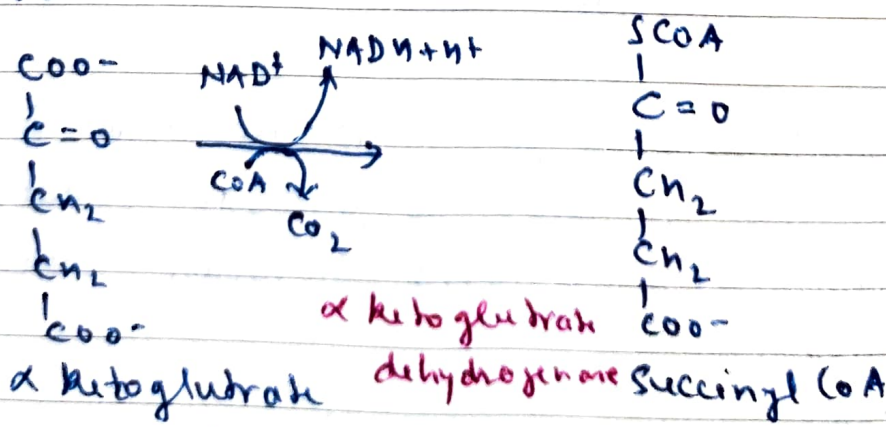

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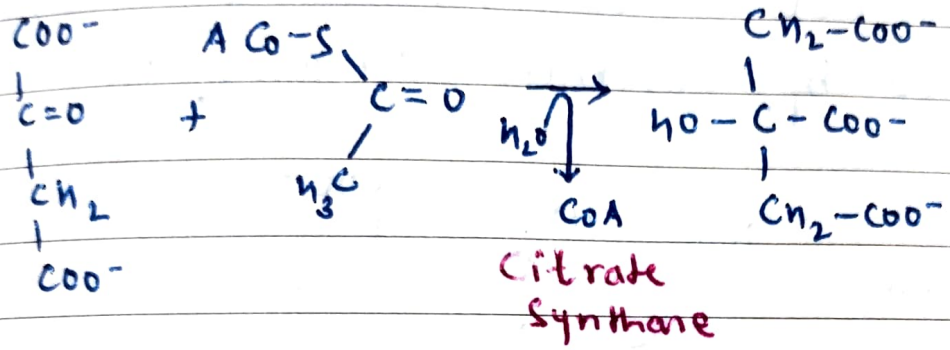

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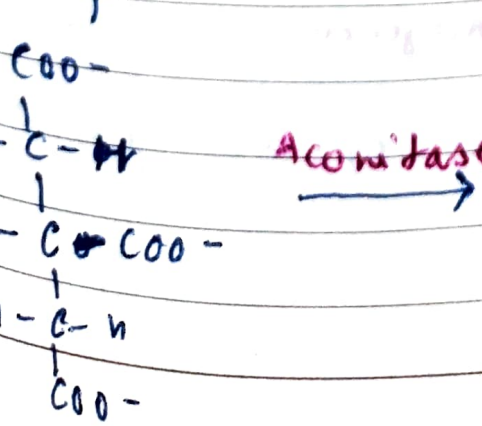

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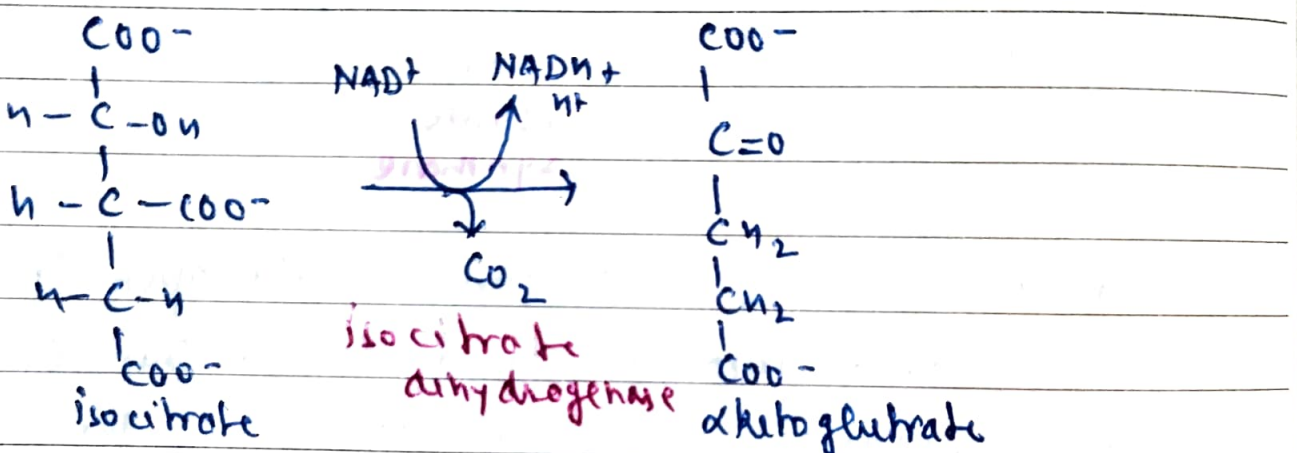

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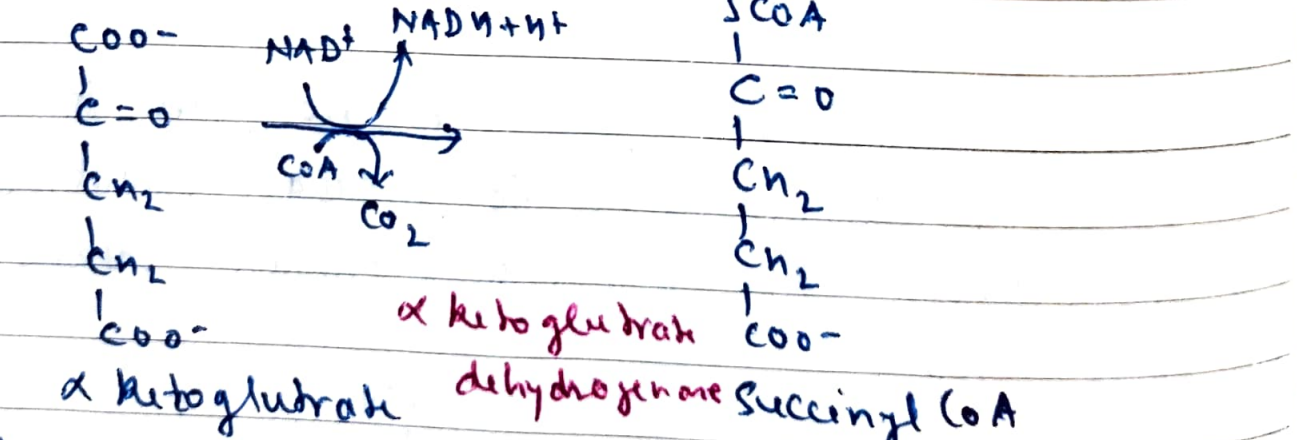
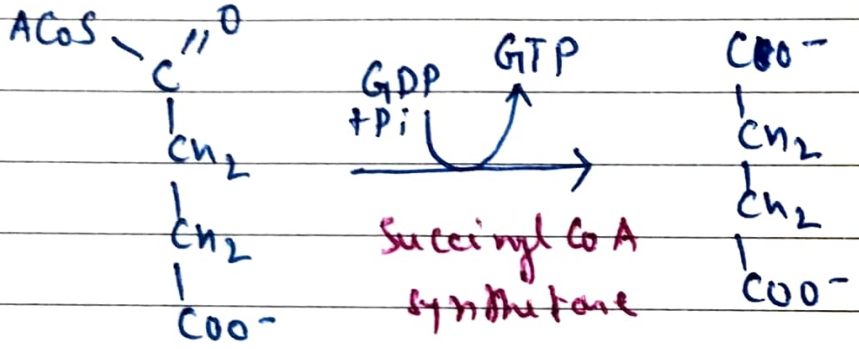
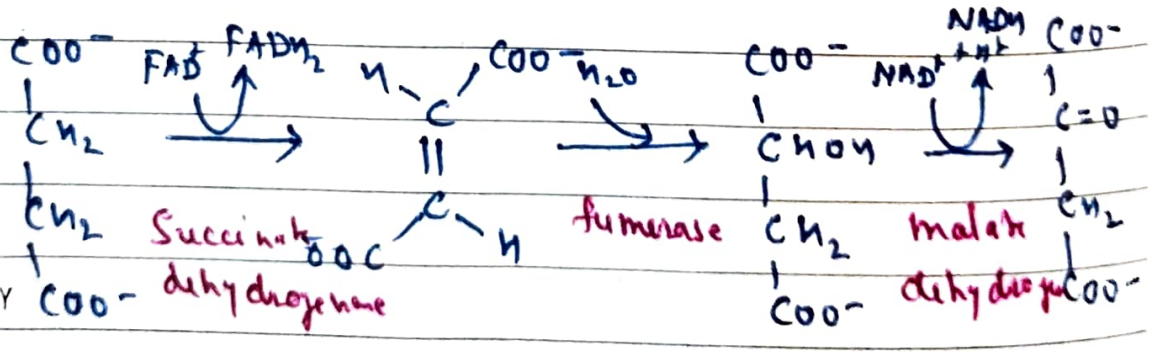


The rxn is catalyzed by α ketoglutrate dehydrogenase.

Succinyl CoA is an energy rich thioester compound. The cleavage of the thioester bond of succinyl-co-A is coupled to the phosphorylation of purine nucleoside diphosphate usually GDP. The rxn is catalyzed by Succinyl Co-A synthetase.



Reactions of four-carbon compounds constitute the final stage of the citric acid cycle: The regeneration of oxaloacetate.



02 SUNDAY

The methylene group is converted into carbonyl gp in three step
i) an oxidation ii) dehydration iii) an oxidation

Succinate dehydrogenase is similar to enzyme aconitase

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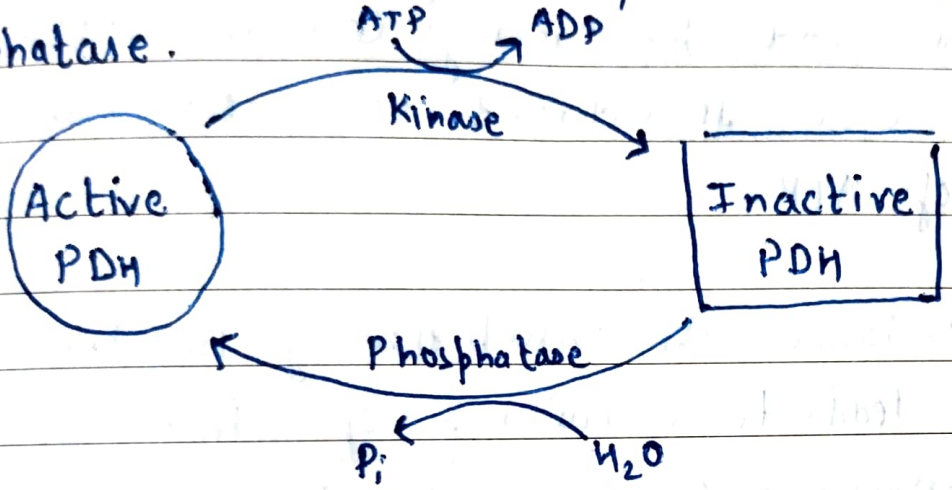
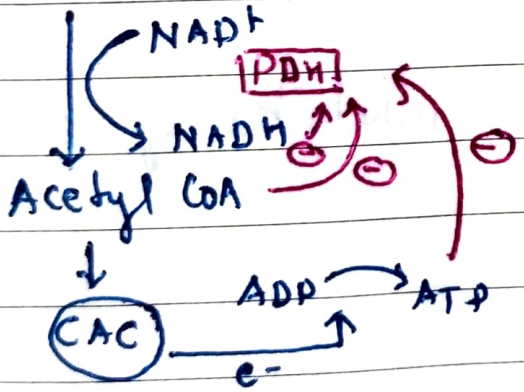
- The key means of regulation of the complex in eukaryotes is covalent modification. Phosphorylation of the pyruvate dehydrogenase component (E_1) by a specific kinase switches off the activity of the complex.
- Deactivation is reversed by the action of a specific phosphatase.



High Energy Charge



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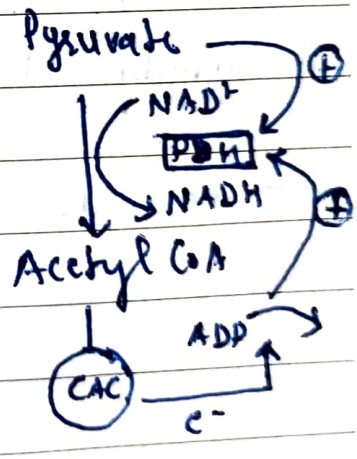

- Phosphatase is stimulated by Ca^{2+}, the same signal that initiate muscle contraction. A rise in the cytoplasmic Ca^{2+} level elevates the mitochondrial Ca^{2+} level. Mitochondrial Ca^{2+} activates the phosphatase, enhancing pyruvate dehydrogenase activity.

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- The first control site is isocitrate dehydrogenase - The enzyme is allosterically stimulated by ADP. The binding of isocitrate, NAD^+, Mg^{2+} and ADP is mutually cooperative. In contrast ATP is inhibitor.

- 2nd control site is α-ketoglutrate dehydrogenase - It is inhibitated by Succinyl CoA and NADH. The rate of the Cycle is reduced when the cell has a high level of ATP.

- For instance the inhibition of isocitrate dehydrogenase leads to a buildup of citrate, because the interconvession of isocitrate and citrate is readily reversible under intracellular conditions. Citrate can be transported to the cytoplasm where it signals phosphofructokinase to halt glycolysis.

- ATP is an allosteric inhibitor of citrate synthase.

2014

Glyoxalate Cycle

Many plants and bacteria are able to subsist on acetate or other compounds that yield acetyl Co-A. Acetyl CoA can be synthesized from acetate and CoA by an ATP driven reaction catalyzed by acetyl CoA synthetase.

Acetate + CoASH + ATP $\rightleftharpoons$ acetyl CoA + AMP + PP_i

Synthetase

- Acetyl CoA exist in many organism including humans.

- Plants and some bacteria have a metabolic pathway absent in most other organism that convert two carbon acetyl units into four-carbon unit (Succinate) for energy production and biosyntheses. The reaction sequence called the glyoxalate cycle.

- In plants, these reaction take place in organelle called glyoxysomes. This cycle is especially prominent in oil-rich seeds, such as those from sunflower, cucumber and castor bean.