ATP Production

Roaa elhoudiry
Shaima Fawzi

ILOs

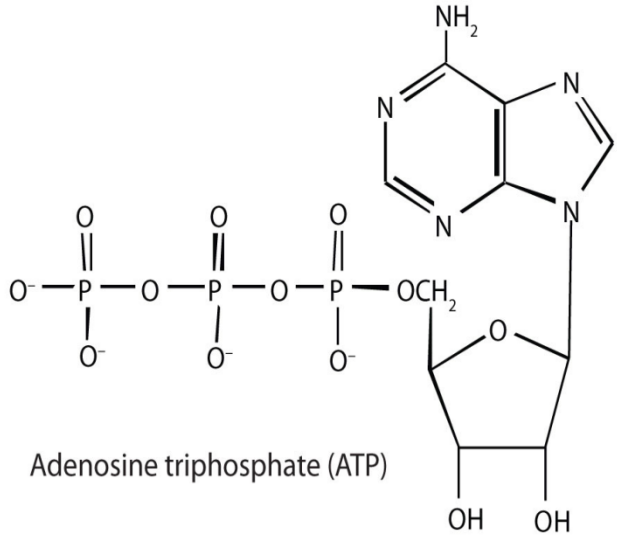
- Define ATP production.
- Explain ATP production pathways.
- Diffrentiate between substrate level phosphorylation and oxidative phosphorylation.

ATP Production

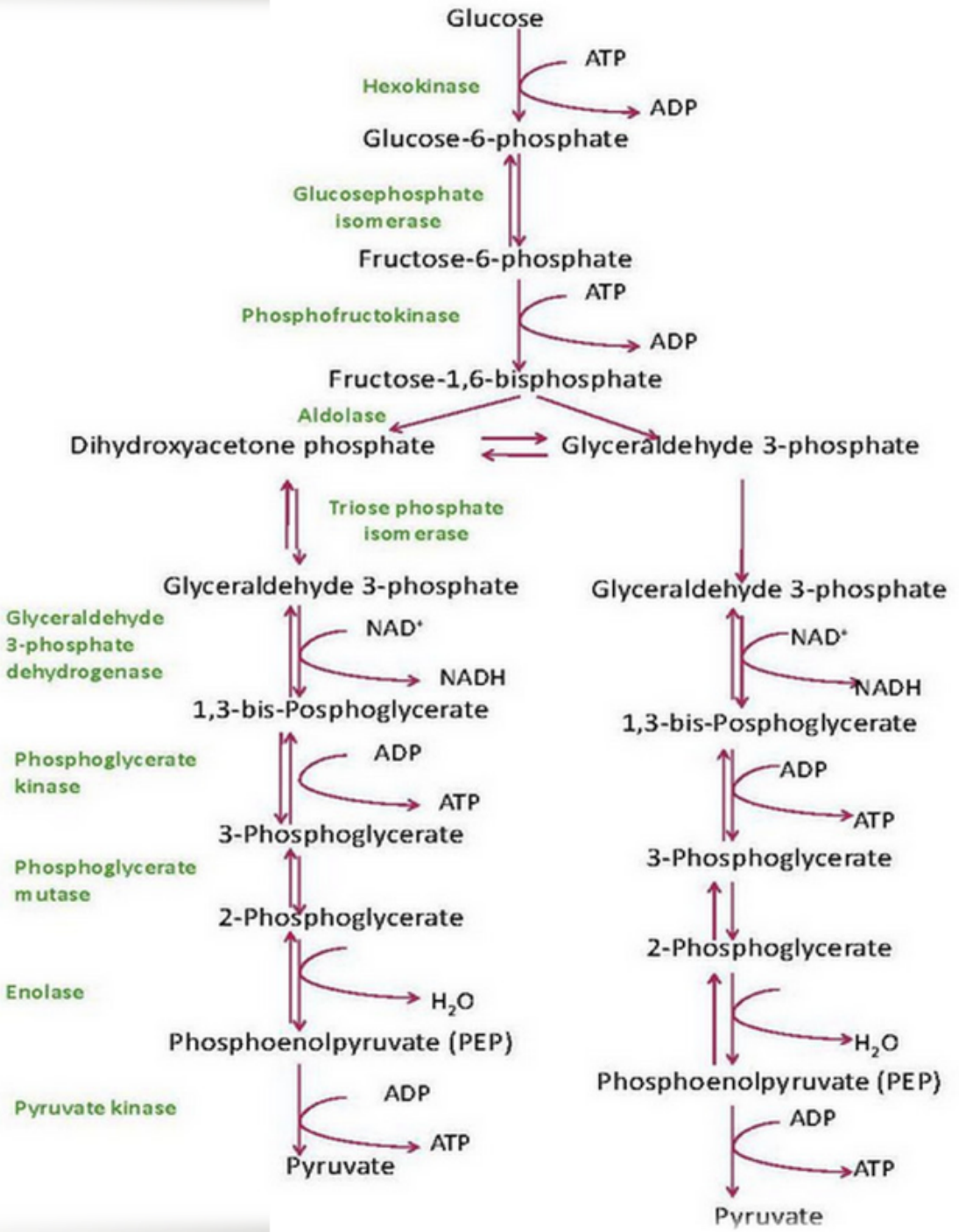
ATP is generated from ADP and phosphate ions by a complex set of processes occurring in the cell. These processes depend on the activities of a special group of coenzymes. Three important coenzymes are (NAD) , and (FAD)

ATP Production Pathways

- There are several pathways to produce energy, including :
    - Glycolysis
    - Krebs cycle
    - Oxidative phosphorylation
    - Substrate level

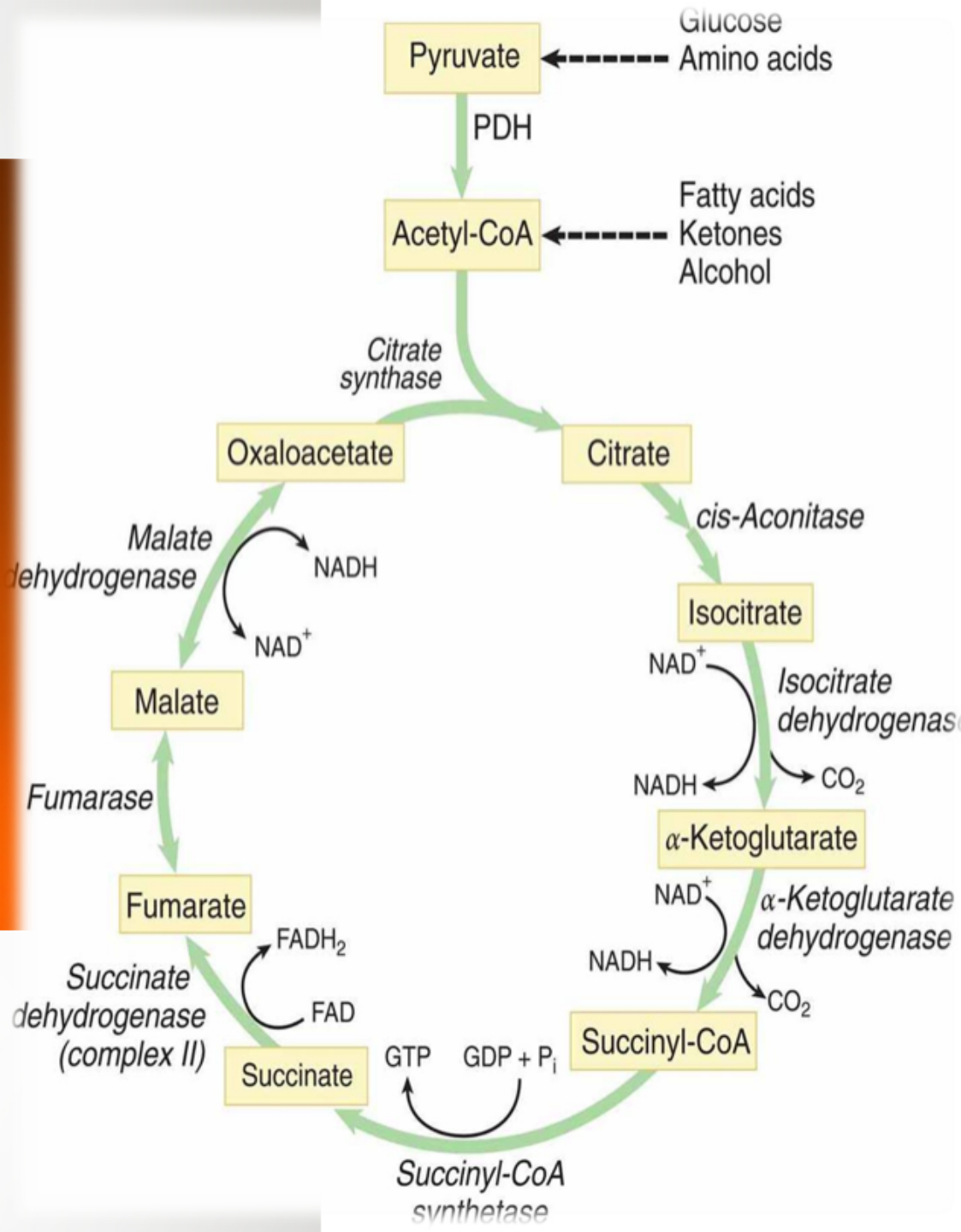


Adenosine triphosphate (ATP)



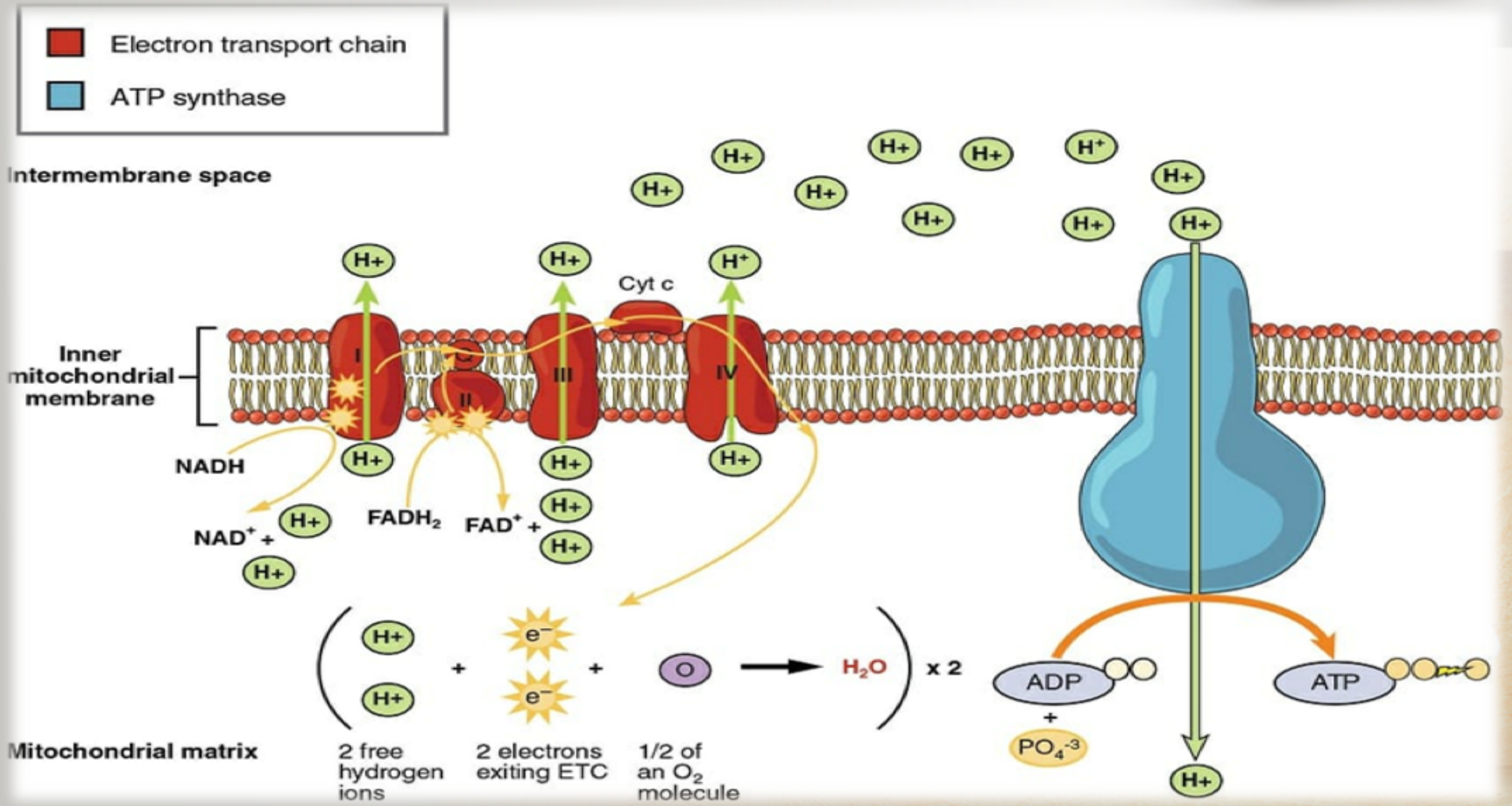
Steps [1] – [5] energy investment phase

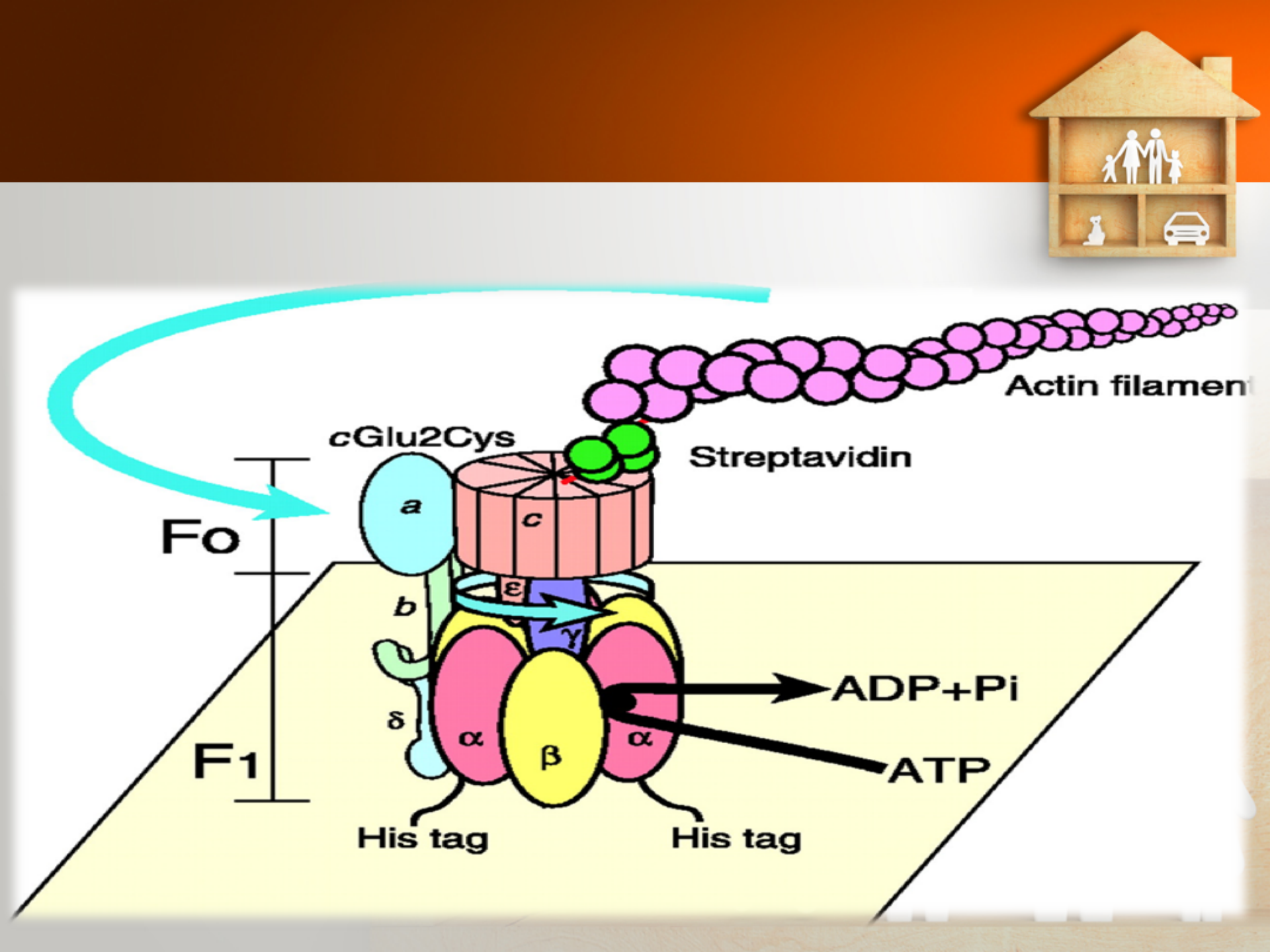
- Steps [6] – [10] energy-generating phase: producing 1 NADH and 2 ATPs for each pyruvate formed



The Total ATP Produced from Krebs Cycle is 24

Oxidative Phosphorylation




Actin filament
cGlu2Cys
Streptavidin
a
c
Fo
ε
b
γ
ADP+Pi
δ
α
β
α
ATP
F1
His tag
His tag

Substrate Level Phosphorylation

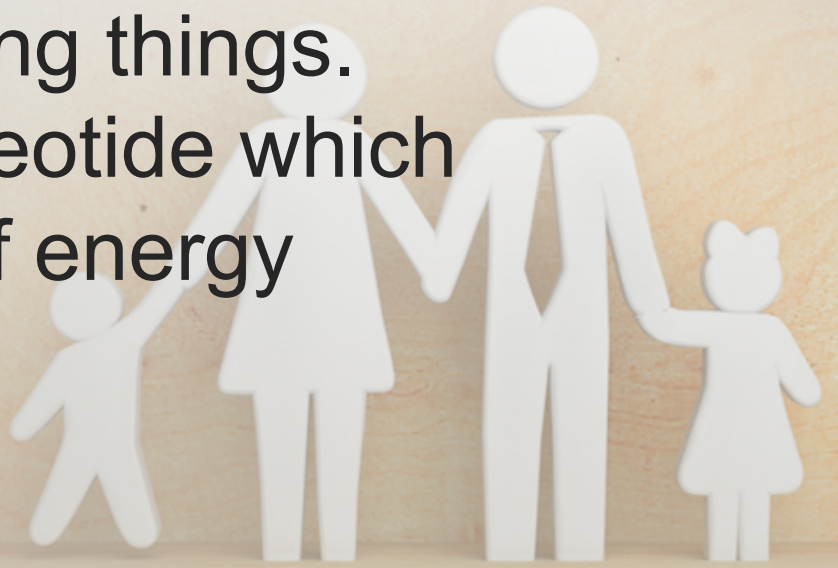
- Is a metabolic reaction that results in the formation of ATP or GTP by the direct transfer of a phosphoryl (PO3) group to ADP from another phosphorylated compound .

Difference Between Substrate Level Phosphorylation and Oxidative Phosphorylation

Substrate Level Phosphorylation	Substrate Level Phosphorylation
refers to a type of phosphorylation in which a phosphate group is transferred from a substrate to ADP	refers to a type of phosphorylation which uses the energy released from the electron transport chain to generate ATP
occurs in the cytoplasm and mitochondria matrix	Oxidative phosphorylation occurs on the inner membrane of mitochondria
NAD and FAD are reduced during the substrate level phosphorylation	NADH and FADH are oxidized during the oxidative phosphorylation
Substrate level phosphorylation occurs in the glycolysis and Krebs cycle	Oxidative phosphorylation occurs in the electron transport chain

Summary

ATP production is the process by which organic compounds (preferably glucose) are broken apart, releasing energy that is used to produce ATP molecules. Cells need to have ATP because it's the gasoline that powers all living things. ATP is a high energ y nucleotide which acts as an instant source of energy within the cell



References:

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Thank you