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# Glycolysis

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# Objective :

Discuss the function  
of glycolysis

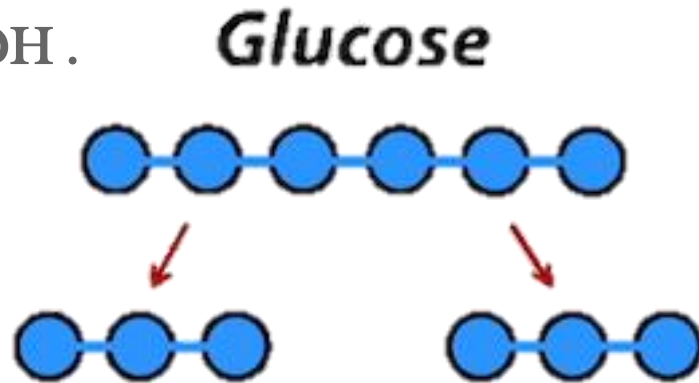
A decorative graphic consisting of a large, light blue dashed circle that frames the text. Various colored circles (solid and hollow) in shades of teal, green, yellow, orange, and pink are scattered around the perimeter of the dashed circle.

# Introduction

Glycolysis is a series of reactions that extract energy from glucose by splitting it into two three-carbon molecules called pyruvates. It occurs in the cytosol of all cells. It is unique in that it can function either aerobically or anaerobically.

# Aerobic glycolysis

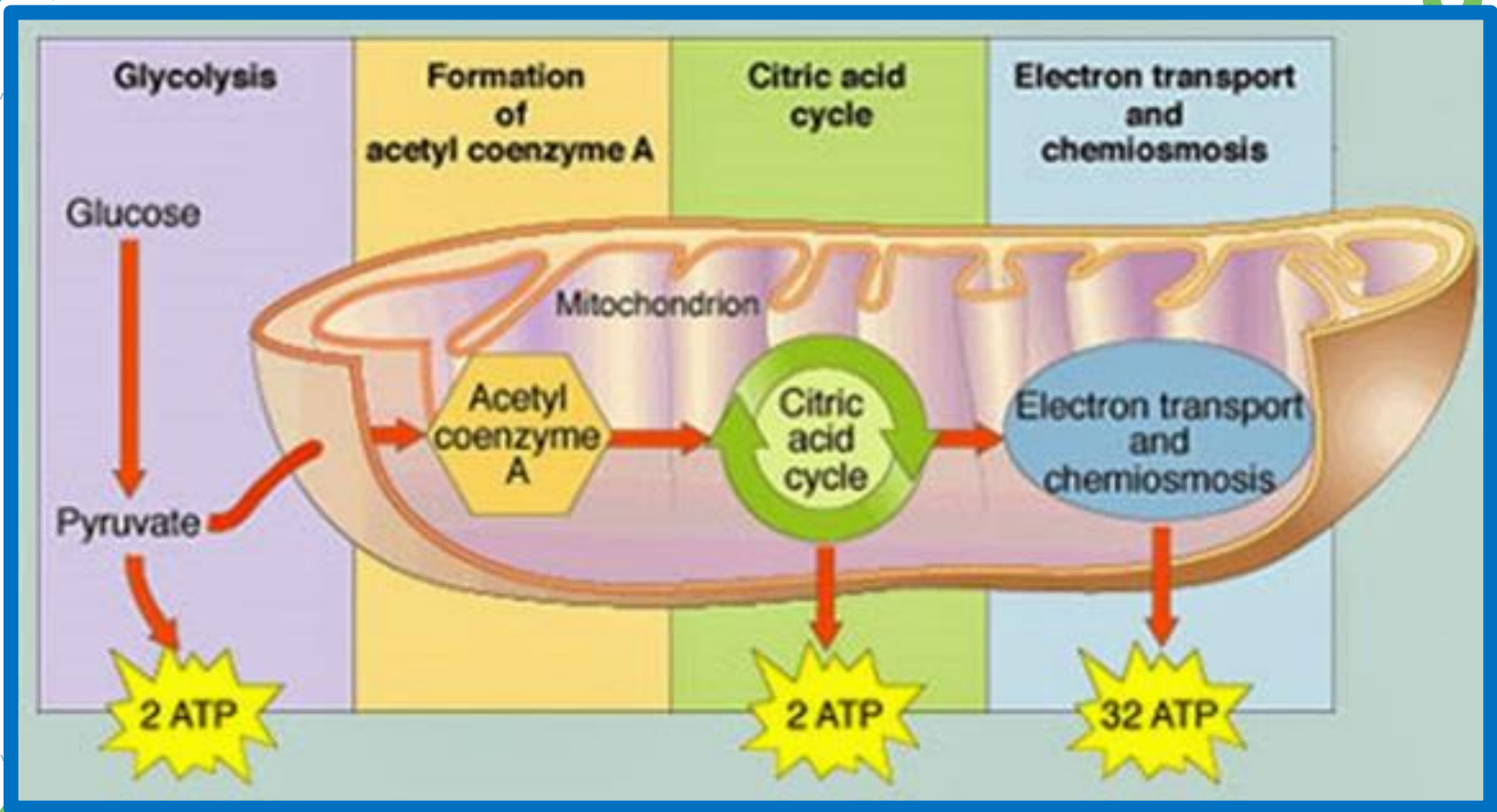
- Occurs in the presence of oxygen in mitochondria .
- The glycolysis process broke down the glucose into 2 pyruvates and NADH .



# Aerobic glycolysis



- In the Krebs cycle the **2 acetyl CoA** is break down and product **2ATP**, **6NADH**, **2FADH<sub>2</sub>**, **2CO<sub>2</sub>**.
- Then the **FADH<sub>2</sub>** & **NADH** → carry electrons to **Electron transport chain** .
- Finally the **ETC** produces **32 ATP** .



# Anaerobic glycolysis

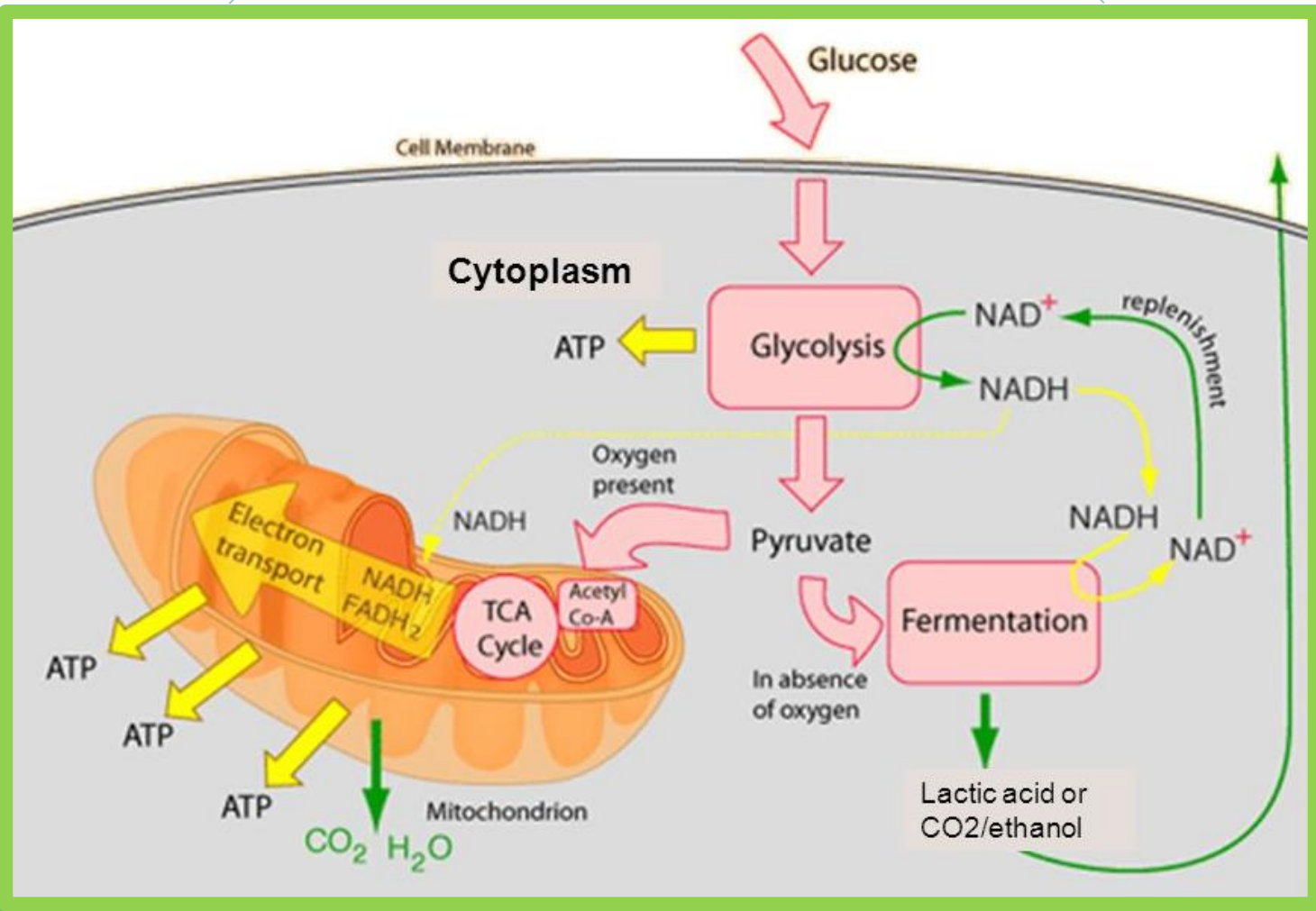
- Occurs in the absence of oxygen or mitochondria or in the absence of both.
- The glycolysis process broke down the glucose into 2 pyruvates and NADH .

Krebs cycle and  
transmission  
chain (ETC) cannot  
happen.

# Anaerobic glycolysis

- Then the 2 molecules of pyruvate use the NADH to releases  $\text{NAD}^{+}$  , which can be used for glycolysis and produce 2ATP and **lactate acid** .
- This process occurs in the RBCs and exercising muscles .







# Alanine synthesis

- © Alanine is a **nonessential amino acid**, meaning that it can be manufactured by the human body, and does not need to be obtained through the diet.
- © Alanine is most commonly produced by reductive amination of pyruvate by two steps.

## First step :

ammonia

+

$\alpha$ -  
ketoglutarate

+

NADH

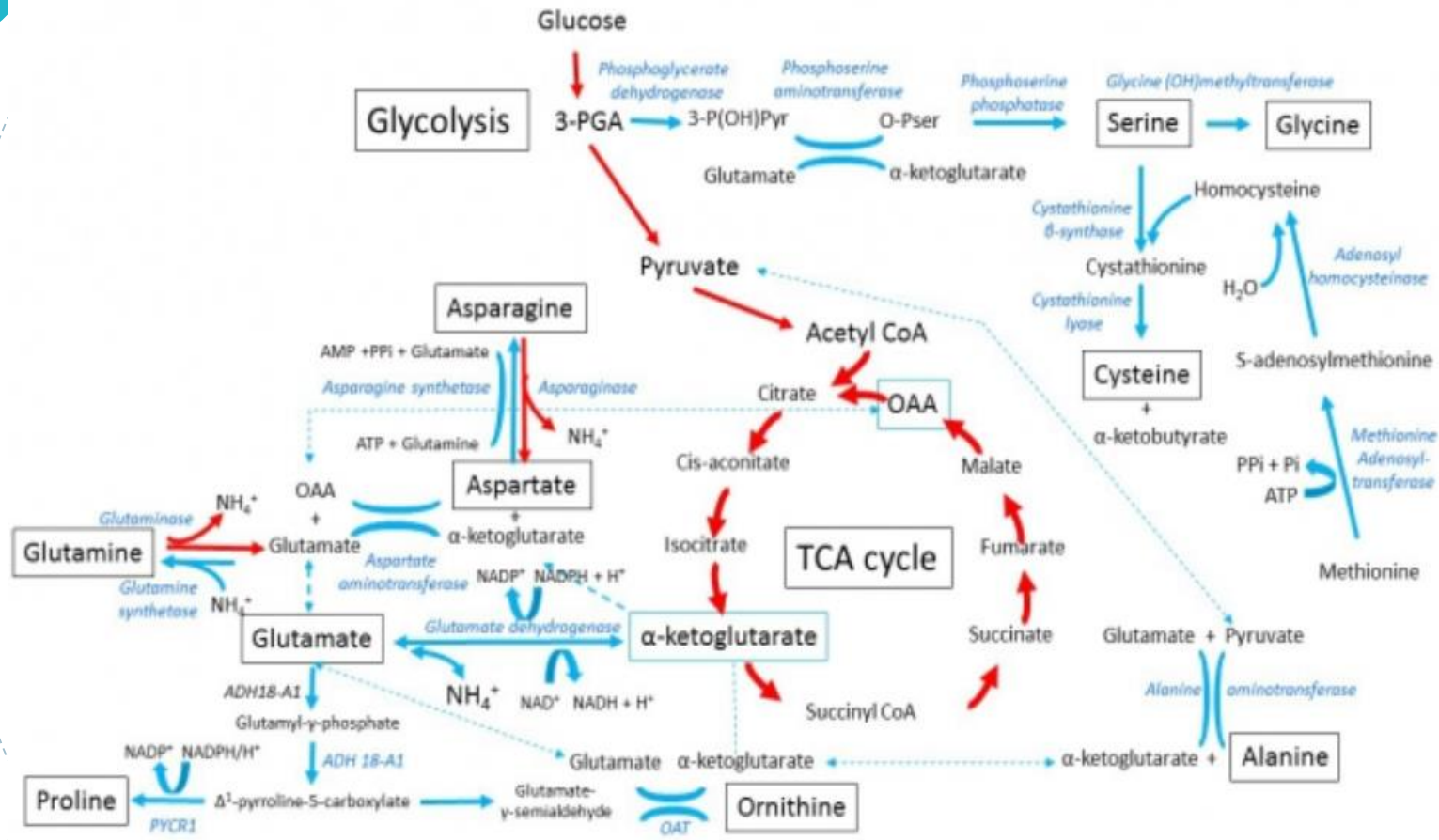
glutamate  
dehydrogenase



glutamate  
+  $NAD^+$  +  
water

## Second step :

the amino group of the newly-formed glutamate is transferred to pyruvate by an aminotransferase enzyme, regenerating the  $\alpha$ -ketoglutarate, and converting the pyruvate to alanine.





# The last function of glycolysis

- ⊙ In erythrocytes, the first site in glycolysis for generation of ATP may be bypassed, leading to the formation of 2,3-bisphosphoglycerate,
- ⊙ which is important in decreasing the affinity of hemoglobin for O<sub>2</sub>.

# Summary

Provide  
energy

Alanine  
synthesis

Decreasing  
the affinity of  
hemoglobin  
for O<sub>2</sub>

Thanks!



Any questions?