

# **9-2 The Krebs Cycle and Electron Transport**

## Glycolysis Recap

What is the purpose of glycolysis?

What are the products of glycolysis?

Oxygen is required for the final steps of cellular respiration.

Cellular respiration is an **aerobic** process.

# The Krebs Cycle

Pyruvic acid produced in glycolysis passes to the second stage of cellular respiration, the **Krebs cycle**.

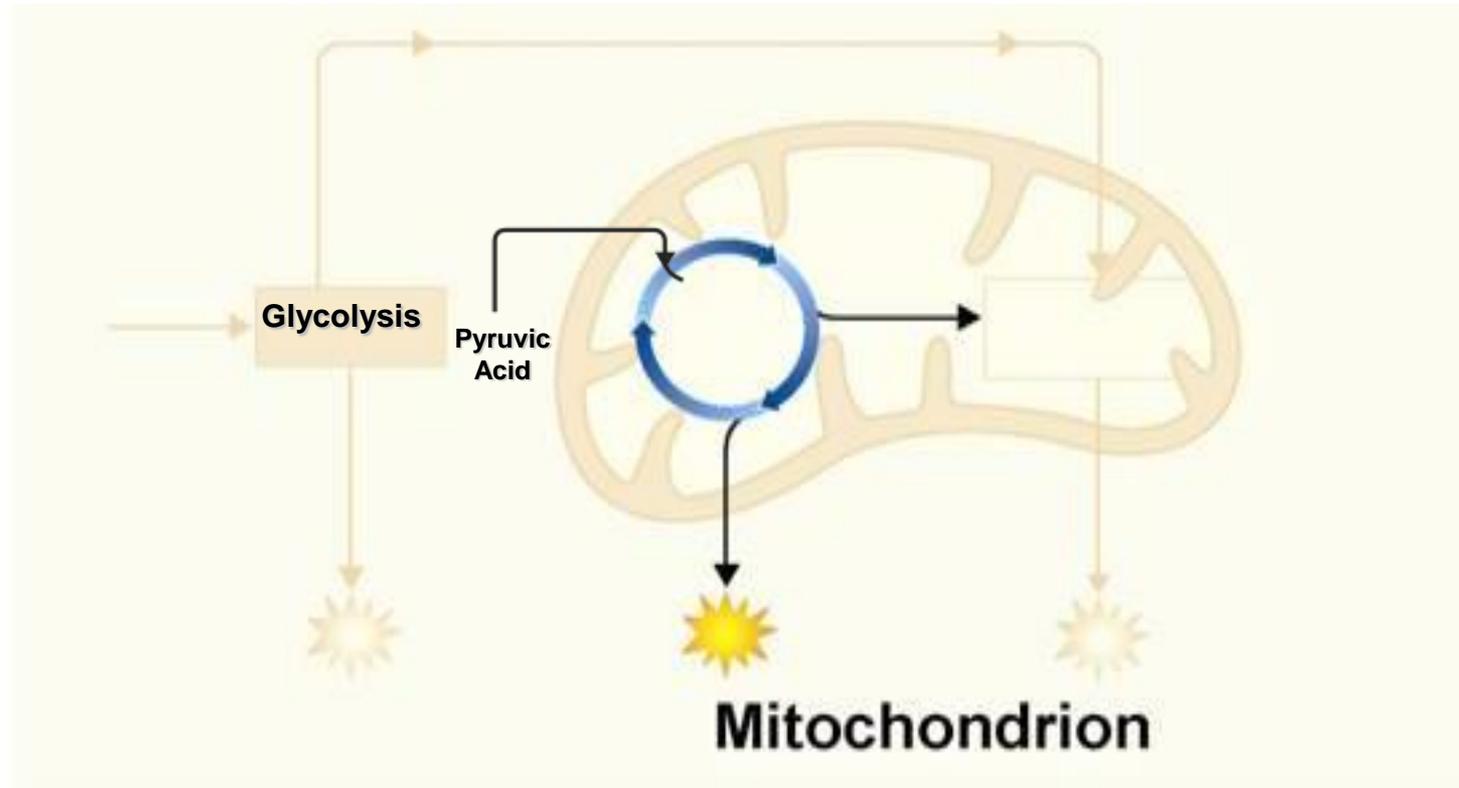
**What happens during the Krebs cycle?**

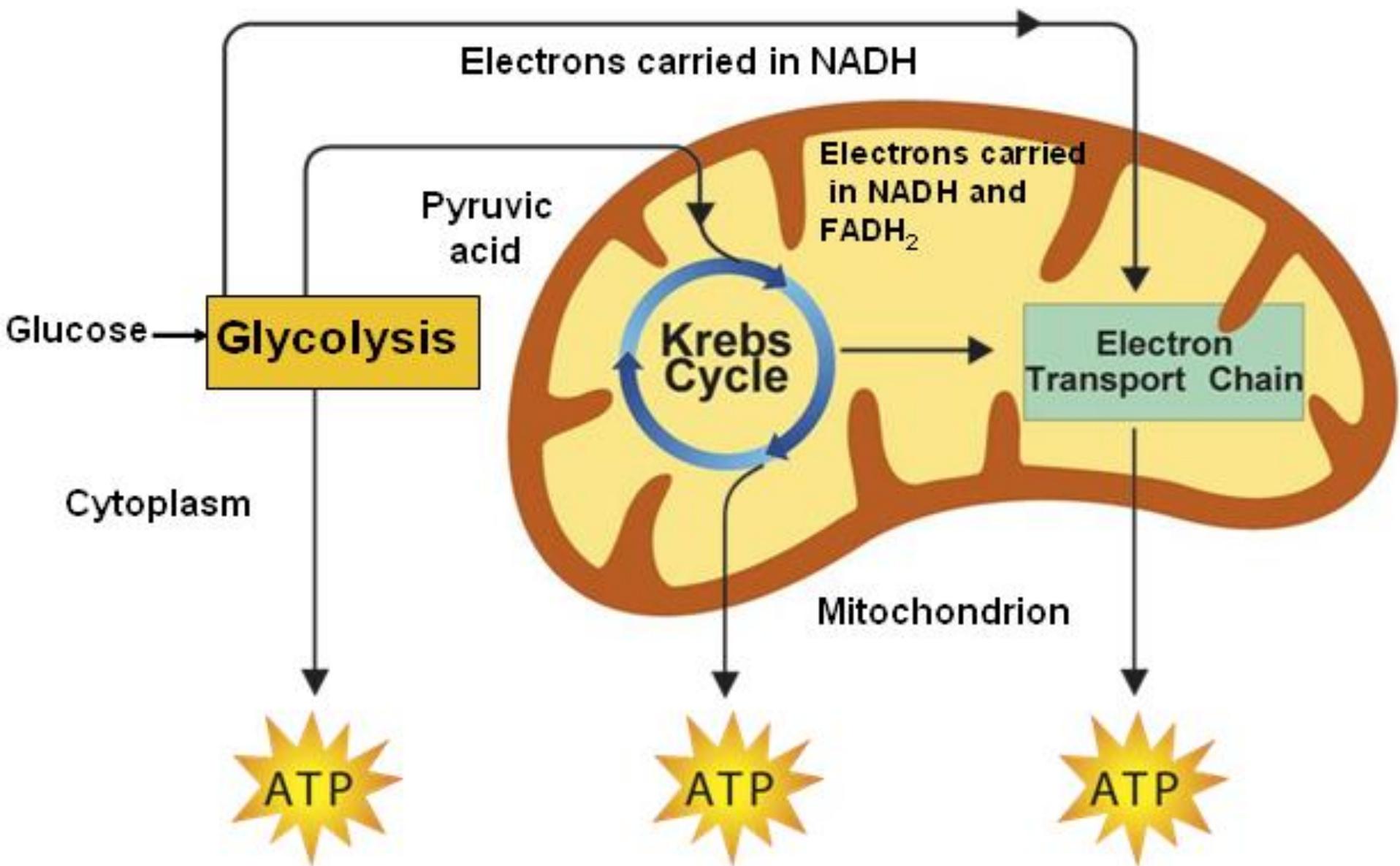
## The Krebs Cycle

**During the Krebs cycle, pyruvic acid is broken down into carbon dioxide while NADH, FADH<sub>2</sub>, and ATP are produced.**

## The Krebs Cycle

The Krebs cycle begins when pyruvic acid from glycolysis enters the mitochondria.





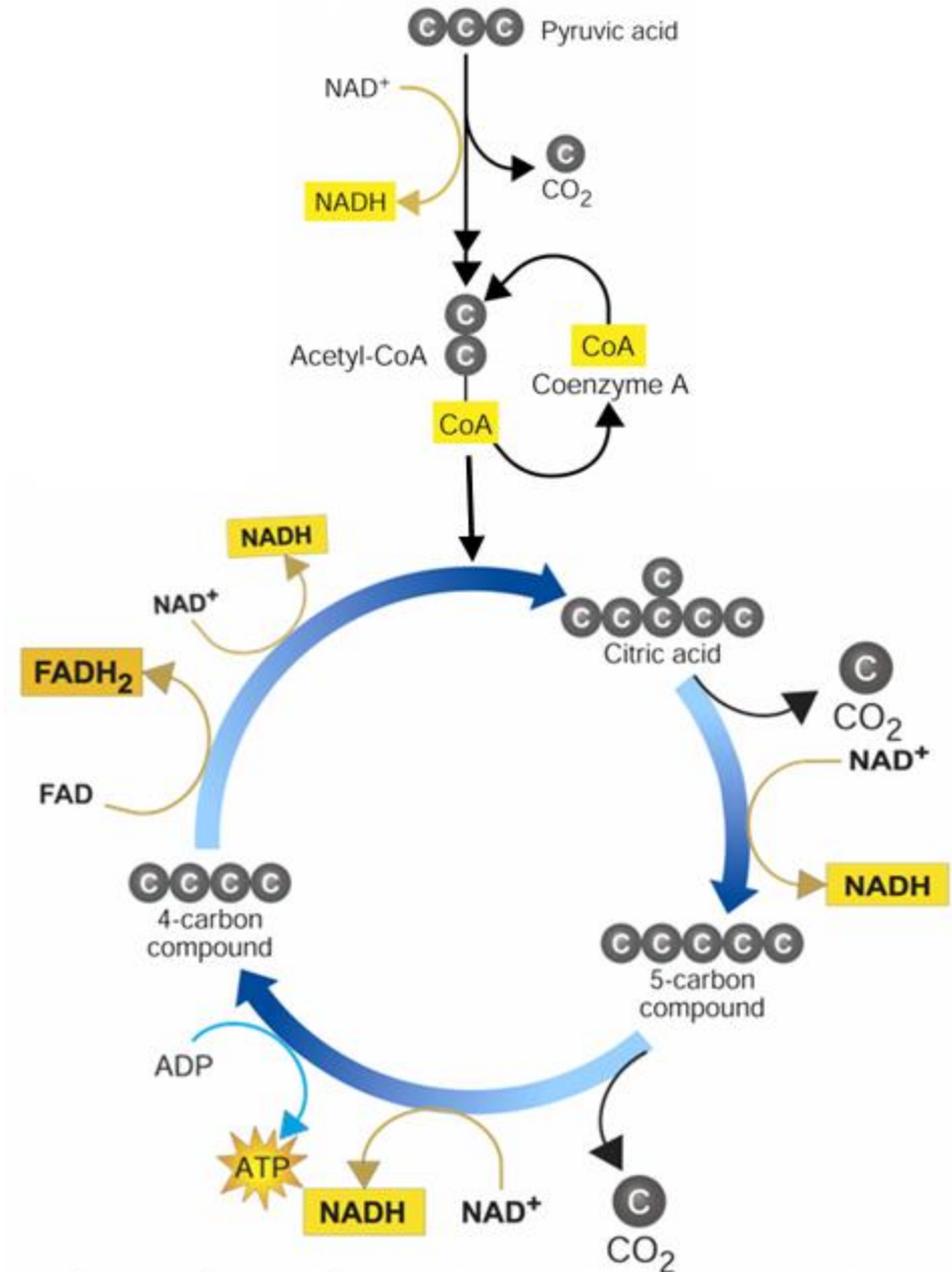
•What is produced in the Krebs Cycle?

–Remember 2 pyruvic acids are produced in glycolysis.

•How many electron carriers?

•How many ATP?

•How many CO<sub>2</sub>?



## The Krebs Cycle

Because 2 pyruvic acids are produced from 1 molecule of glucose, double the numbers for the products of the Krebs Cycle from the previous slide.

- 8 NADH produced
- 2 FADH<sub>2</sub> produced
- 2 ATP produced
- 6 CO<sub>2</sub>

## The Krebs Cycle

Where do the products of the Krebs Cycle go?

Where does  $\text{CO}_2$  go?

Where does ATP go?

Where does NADH and  $\text{FADH}_2$  (high energy electron carriers) go?

**What is the electron transport chain?**

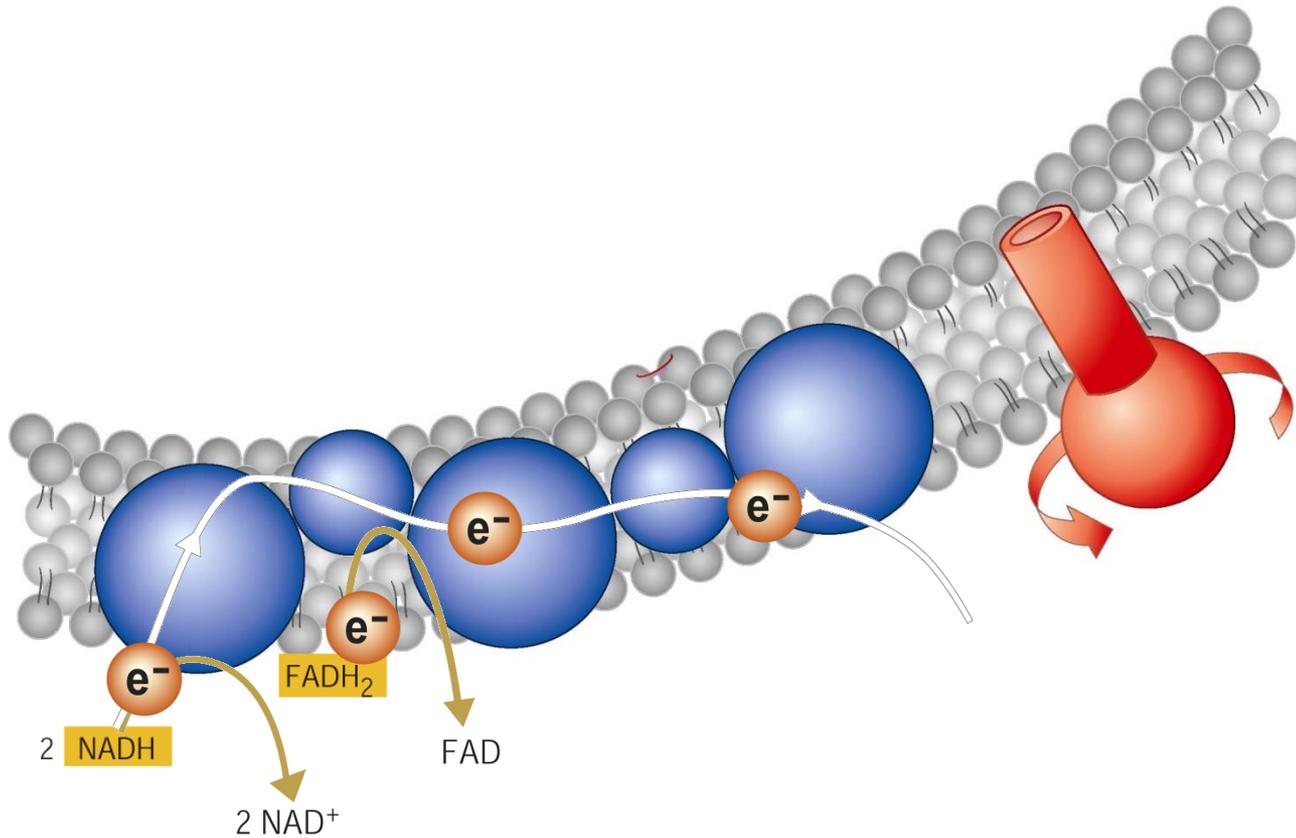
**How are high-energy electrons used by the electron transport chain?**

# Electron Transport

**The electron transport chain uses NADH and FADH<sub>2</sub> from the Krebs cycle to convert ADP into ATP.**

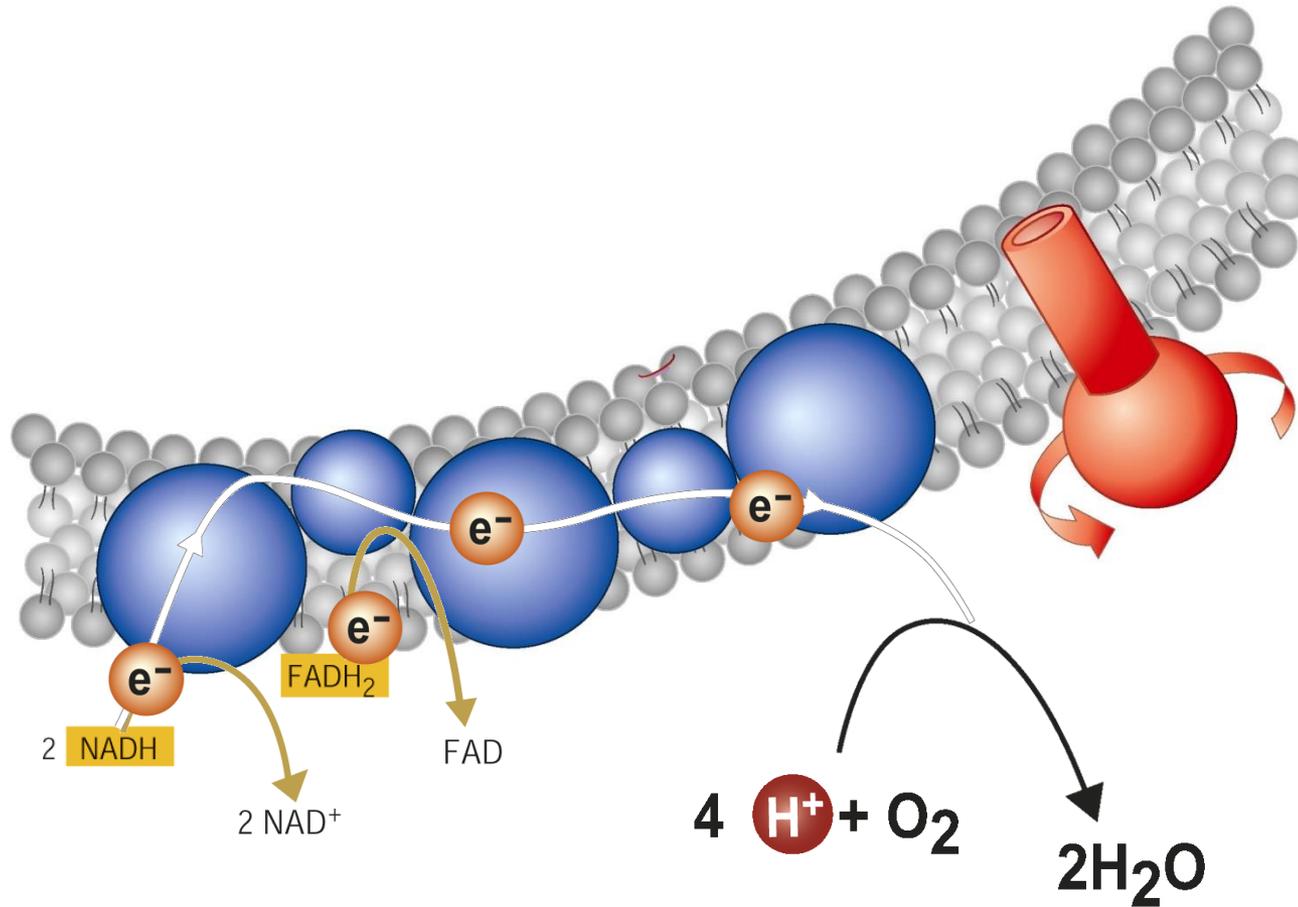
## Electron Transport

High-energy electrons from NADH and FADH<sub>2</sub> are passed along the electron transport chain.



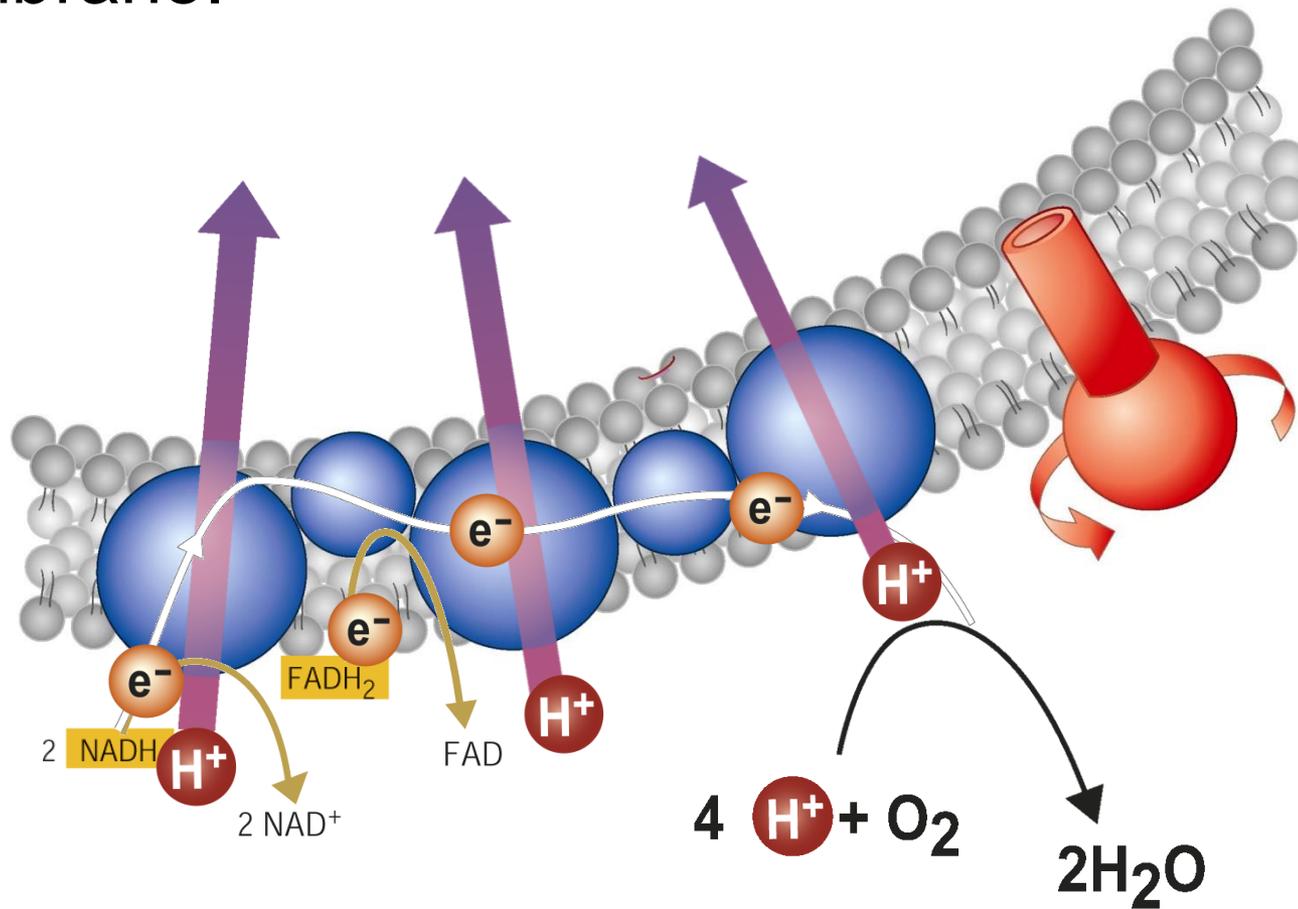
## Electron Transport

At the end of the chain, electrons combine with hydrogen ions and oxygen to form water.



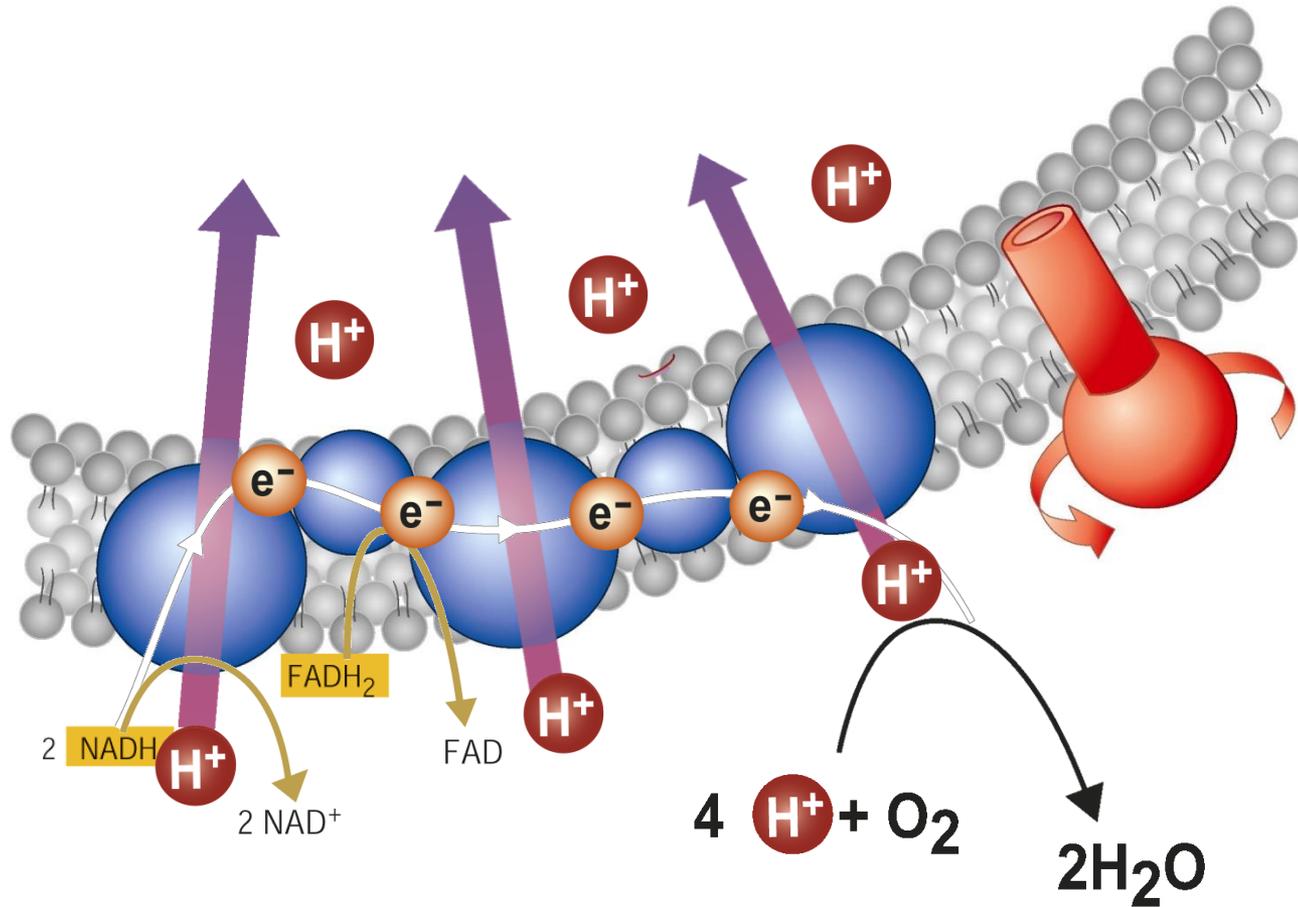
## Electron Transport

The energy from the electrons moving down the electron transport chain move  $H^+$  ions across the membrane.



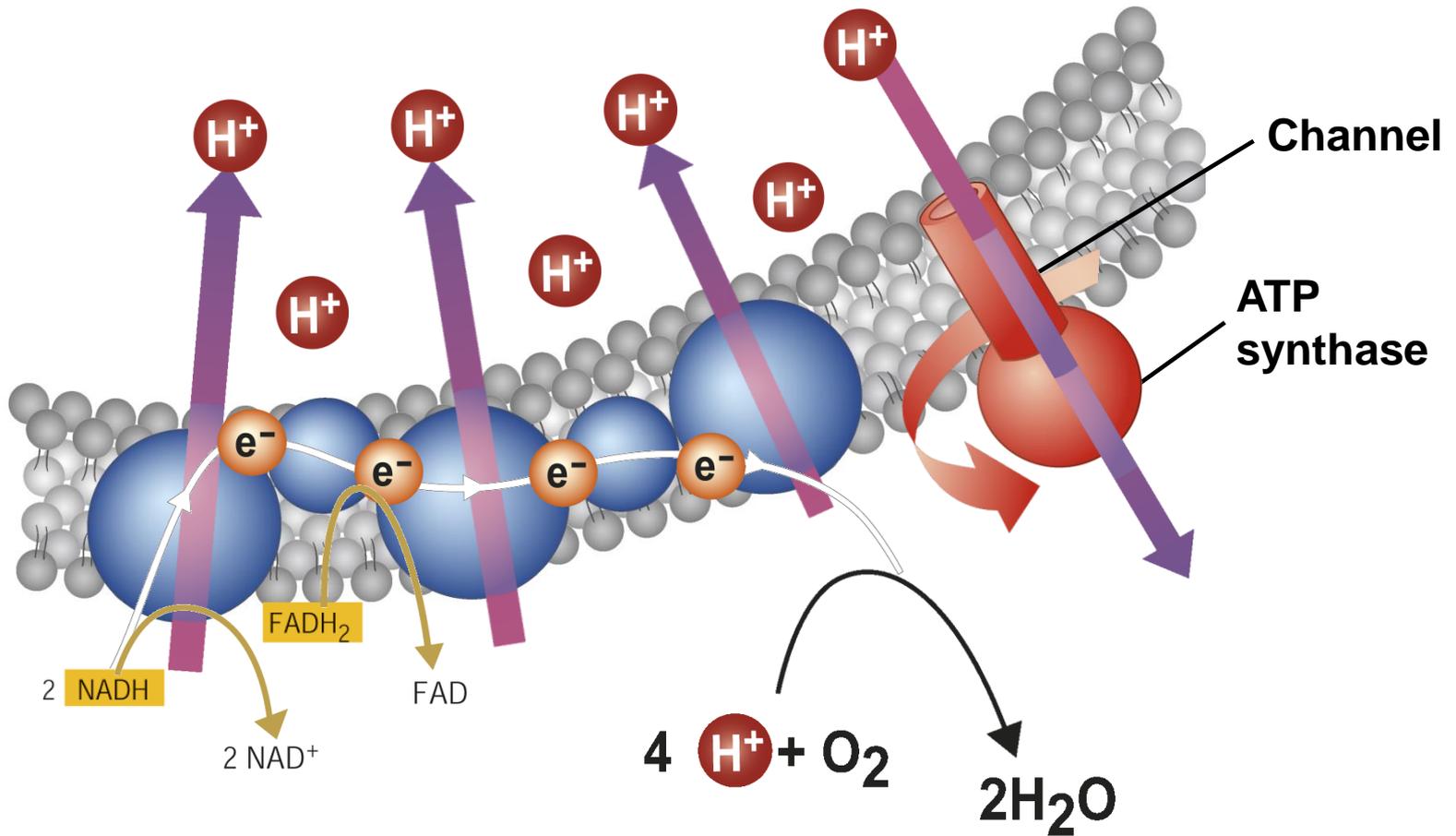
# Electron Transport

$H^+$  ions build up in the intermembrane space.



# Electron Transport

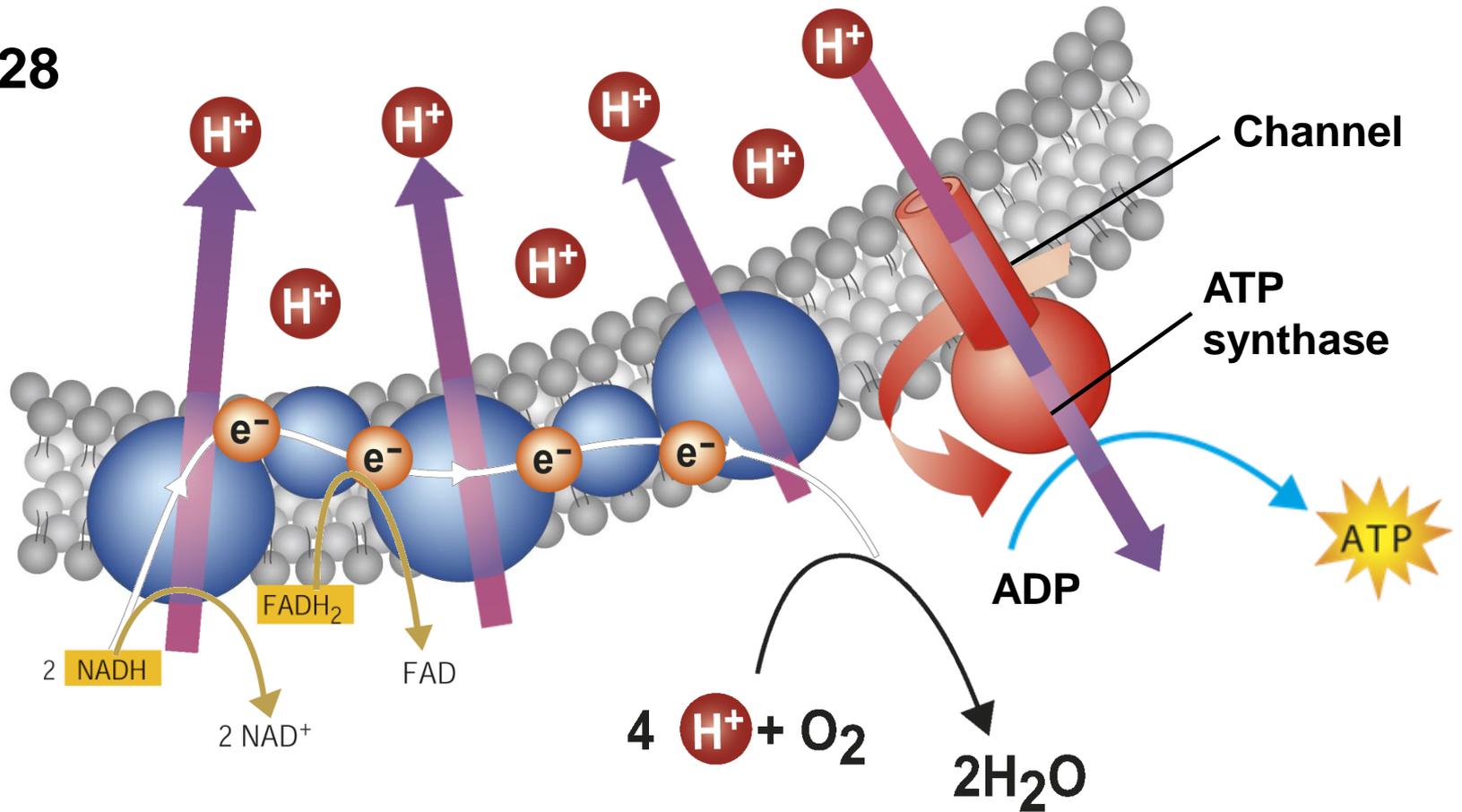
H<sup>+</sup> ions diffuse through ATP synthase and cause it to spin.



## Electron Transport

As it spins, the ATP synthase converts ADP and P to ATP.

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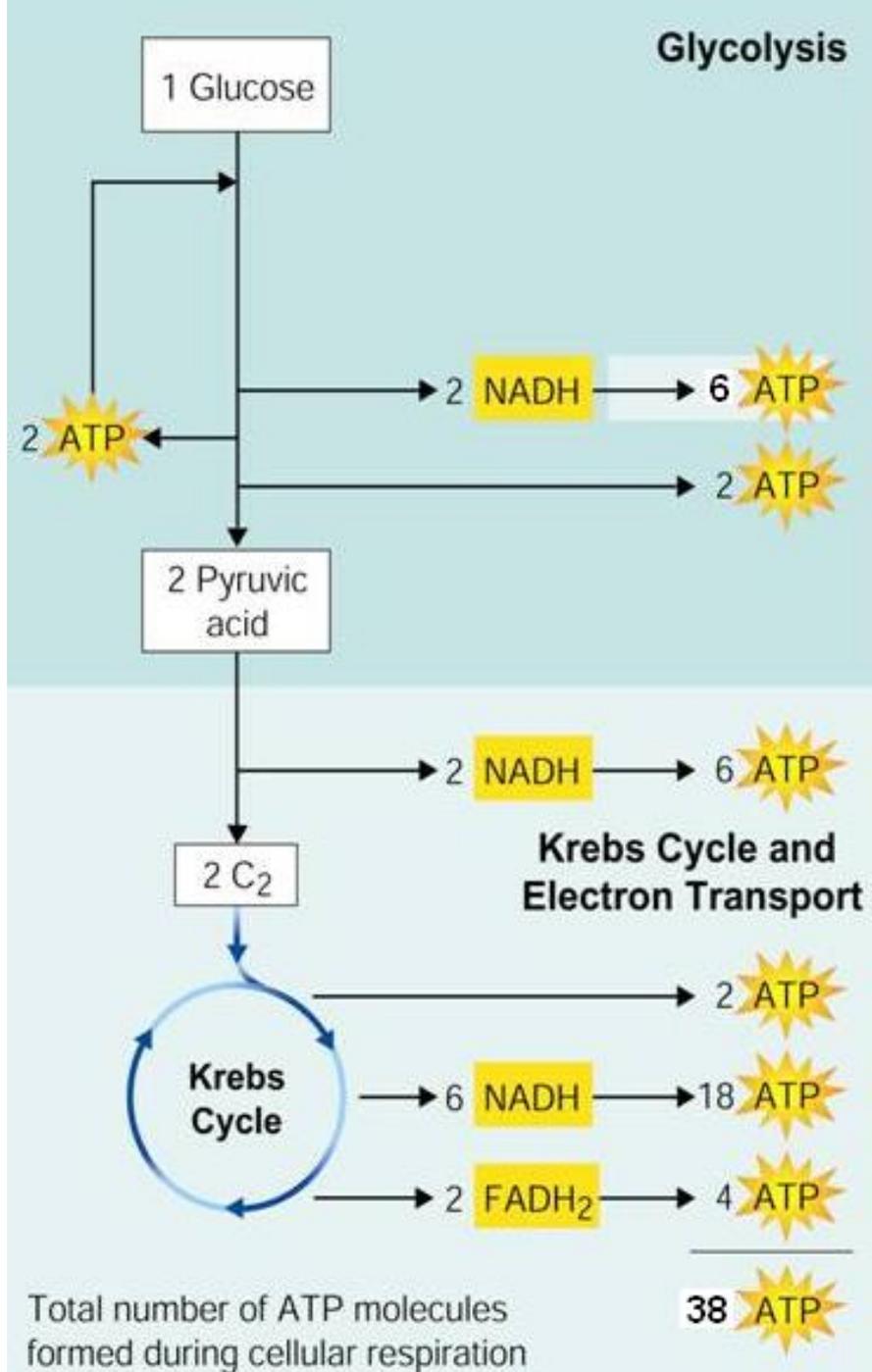
## Electron Transport

For every 1 NADH molecule- 3 ATP produced

For every 1 FADH<sub>2</sub> molecule- 2 ATP produced

# The Totals

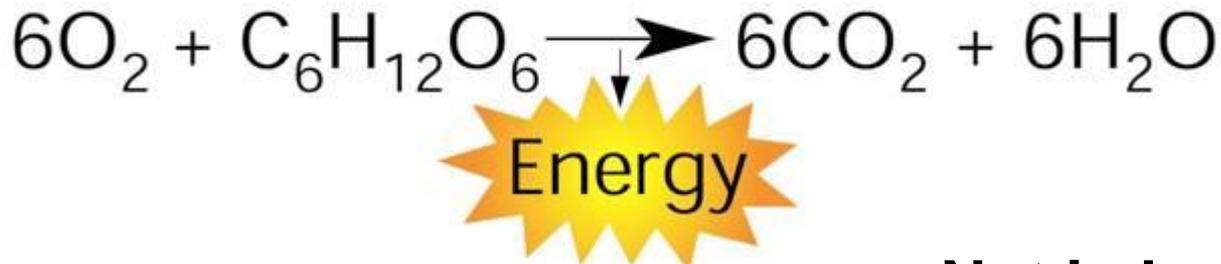
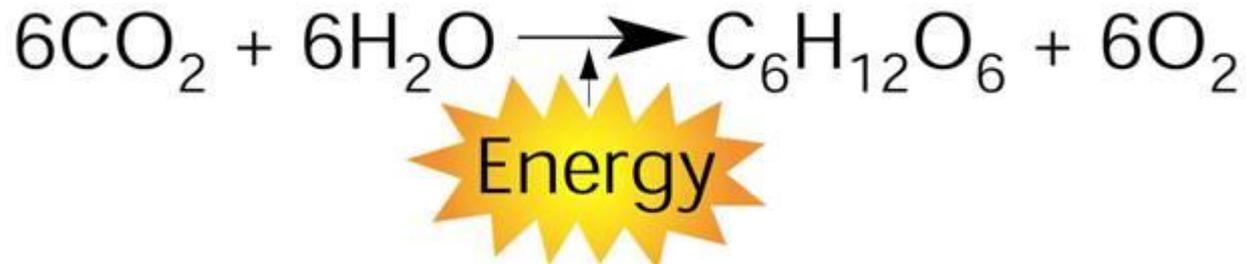
How many total ATP's are produced?



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# Comparing Photosynthesis and Cellular Respiration

The energy flows in photosynthesis and cellular respiration take place in opposite directions.



**Not in book**