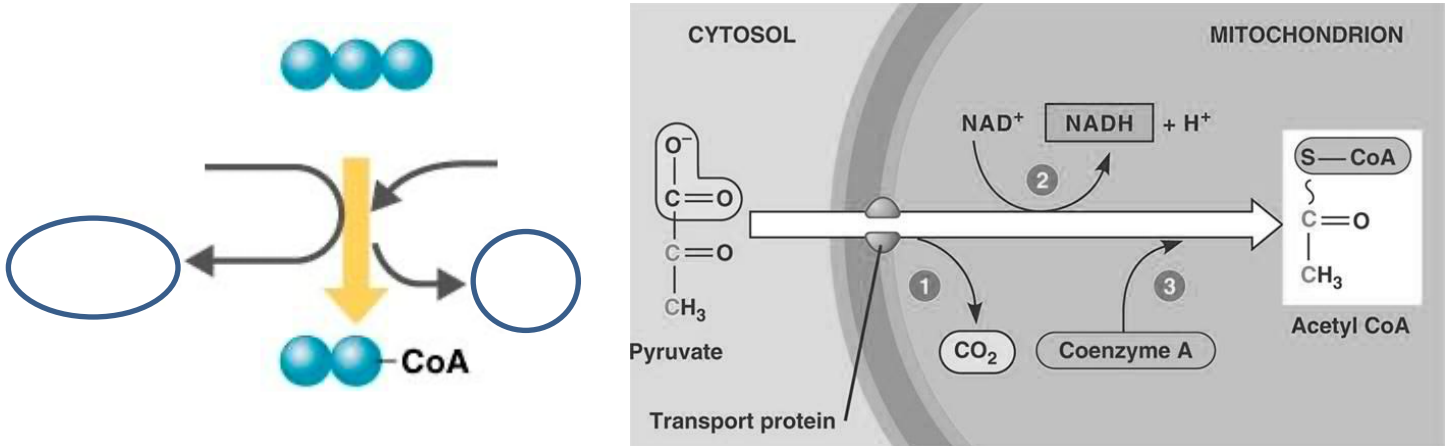


## Pyruvate Oxidation: The Transition Step

- A **3-carbon** molecule of **pyruvate** enters the mitochondrion from the cytoplasm. One **carbon** atom is removed via **decarboxylation** and hydrogen is removed using **NAD<sup>+</sup>**.
- **Coenzyme A (CoA)** becomes attached to the remaining **2 carbon** atoms, creating **Acetyl-CoA** which enters the Krebs cycle.



## Krebs Cycle: The 8 Step Process

- Each step is **catalyzed** by a specific **enzyme**.
- A cyclical process because **oxaloacetate**, the **product** of step 8 is the **reactant** of step 1.
- Cycle turns **twice** for every glucose molecule oxidized.

### Let the Cycle Begin...

- Acetyl-CoA** enters the cycle and combines with **oxaloacetate** to make the 6-carbon compound **citrate**.
- During the 8 steps of the Krebs cycle, **citrate** undergoes a number of reactions, releasing **CO<sub>2</sub>** and **ATP** in a number of steps.
  - **citrate** is eventually converted into **oxaloacetate** so it can be used again in the cycle.


# The Krebs Cycle

**Step 1:** **Acetyl-CoA** reacts with a molecule of **oxaloacetate** to form **citrate**. **CoA** is released.

**Step 2:** **citrate** is rearranged to **isocitrate**

**Step 3:** **isocitrate** is converted to  **$\alpha$  - ketoglutarate** by losing a **CO<sub>2</sub>** and 2 **hydrogen** atoms that reduce **NAD<sup>+</sup>** to **NADH**

**Step 4:**  **$\alpha$  - ketoglutarate** is converted to **succinyl-CoA**. A **CO<sub>2</sub>** is removed, **CoA** is added and 2 **hydrogen** atoms reduce **NAD<sup>+</sup>** to **NADH**

**Step 5:** **succinyl-CoA** is converted to **succinate**.  **ATP** is formed by substrate level **phosphorylation** and **CoA** is released.

**Step 6:** **succinate** is converted to **fumarate**. **FAD** is reduced to **FADH<sub>2</sub>**

**Step 7:** **fumarate** is converted to **malate** via the addition of **H<sub>2</sub>O**

**Step 8:** **malate** is converted to **oxaloacetate** and **NAD<sup>+</sup>** is reduced to **NADH**

## SUMMARY:

The Krebs cycle produces: **2 CO<sub>2</sub>** **2 ATP** **6 NADH** **2 FADH<sub>2</sub>**

# The Krebs Cycle

The Krebs Cycle

