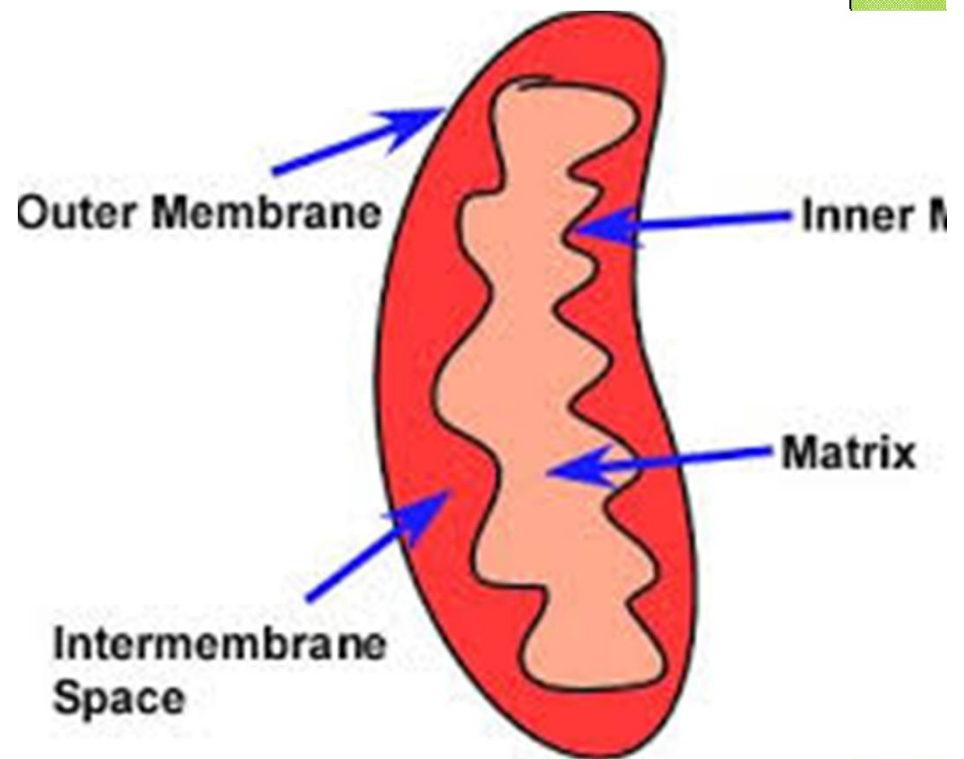


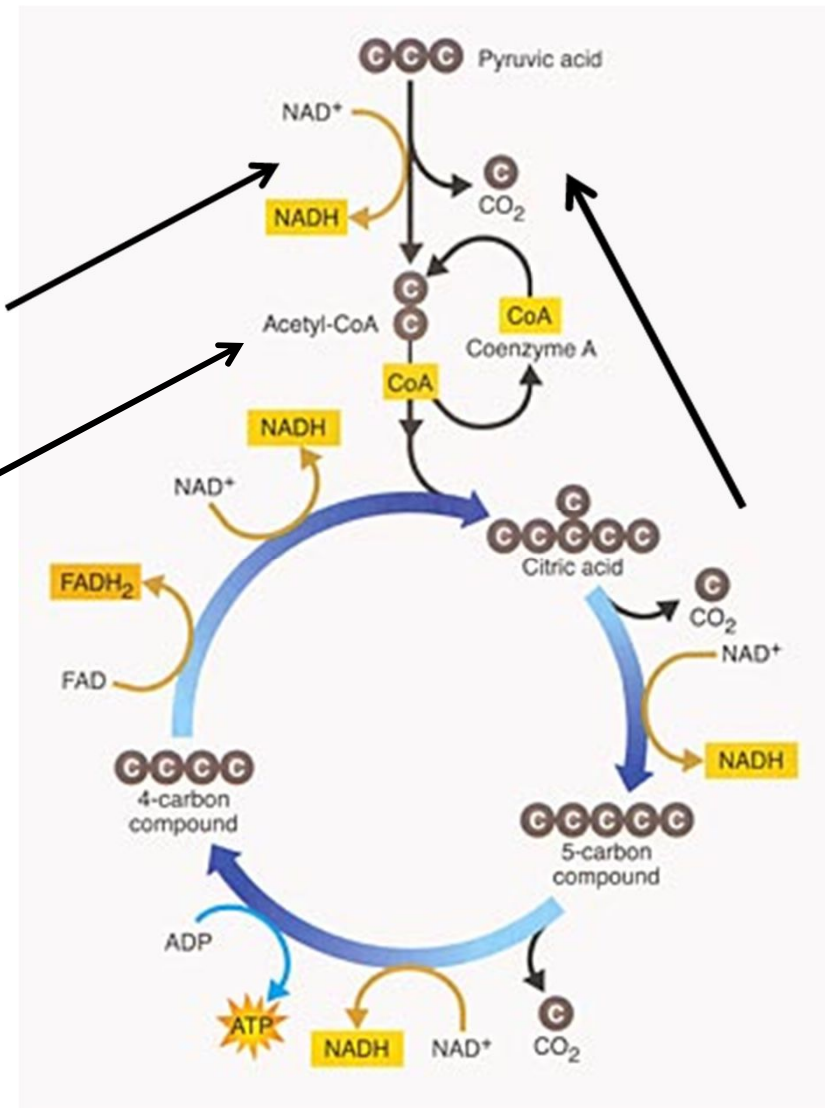
# Krebs Cycle

- Most energy from the glucose is still in the pyruvate made in glycolysis
- If oxygen is present:
  - Pyruvate goes into the mitochondria matrix
  - Converted to carbon dioxide
  - This is the Krebs cycle (citric acid cycle)



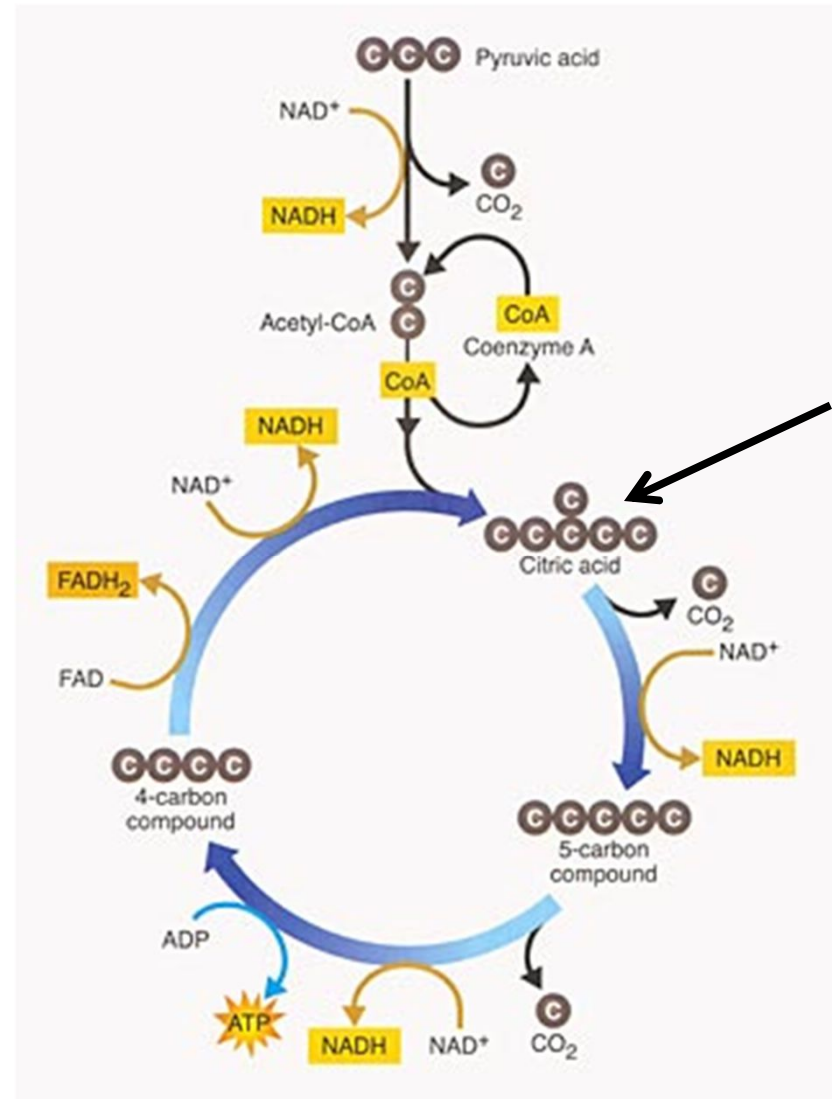
# Krebs Cycle

- Pyruvate (3 C) comes in
- Reacts to form a 2 C molecule
- Makes NADH (energy storage)
- Makes CO<sub>2</sub>



# Krebs Cycle

- A 6 C compound is then formed – called citric acid
- Citric acid breaks down to form  $\text{CO}_2$ , ATP, NADH and  $\text{FADH}_2$  (energy storage)



# Krebs Cycle

- Two pyruvate were formed in glycolysis...
- So that means the Krebs Cycle happens TWICE for each glucose
- Overall yield:
  - 6 CO<sub>2</sub>
  - 2 ATP
  - 8 NADH
  - 2 FADH<sub>2</sub>

# Aerobic vs Anaerobic Respiration

- If oxygen is present, the cell then goes through aerobic respiration
- If oxygen is not present, the cell then goes through anaerobic respiration
- Aerobic respiration is preferred!!!
  - Makes the most energy
  - Produces 24 ATP!
  - **Total overall cellular respiration = 36 ATP**

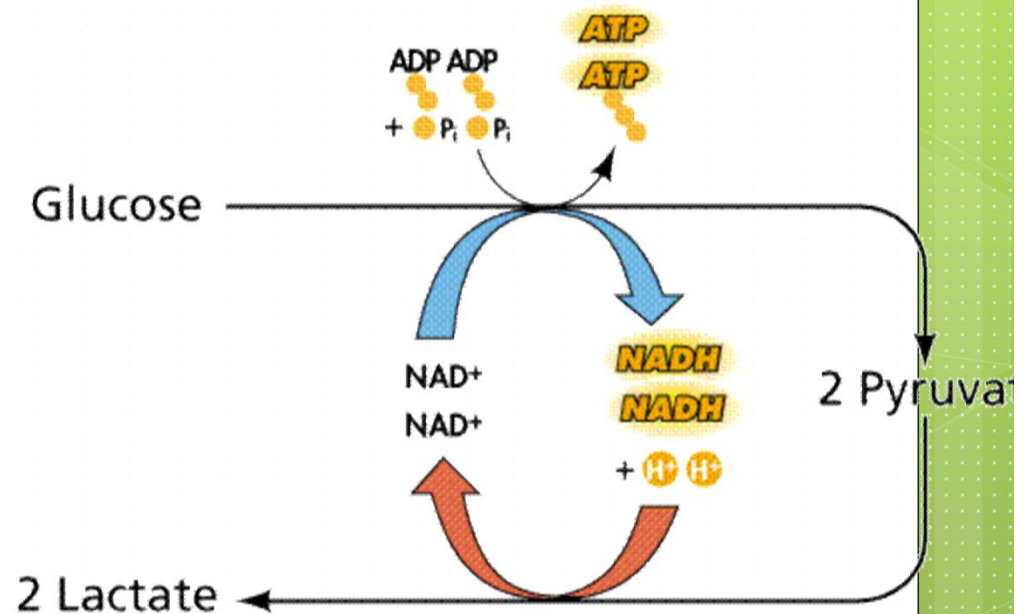
# Anaerobic Respiration

- Also known as fermentation
- Occurs in the cytoplasm
- Produces a small amount of ATP
- Two main types:
  - Lactic acid fermentation
  - Alcohol fermentation

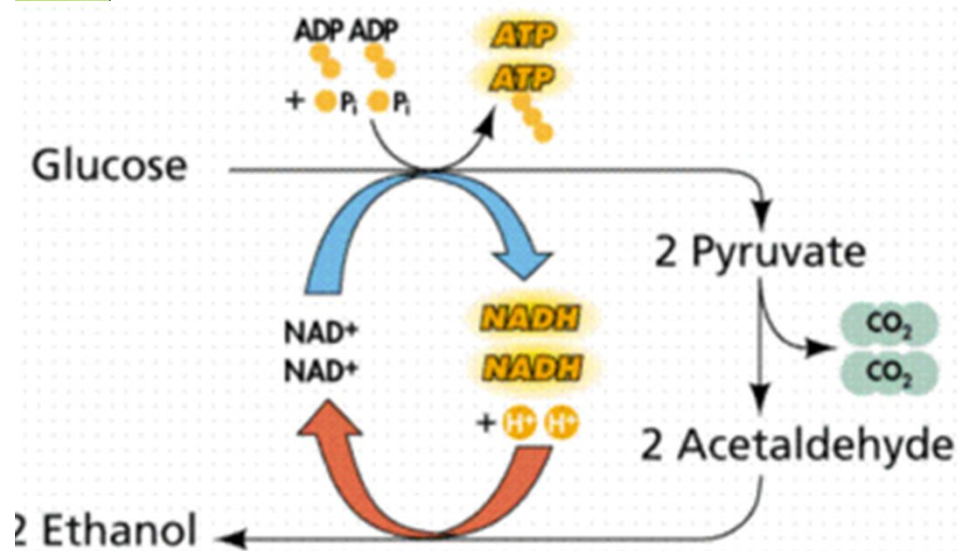


# Lactic Acid Fermentation

- *Think of your clothespin lab!*
- Pyruvate is turned into lactic acid
- Happens in muscle cells when oxygen level is low
- Made by microorganisms and turned into cheese, milk and yogurt



# Alcohol Fermentation



- Happens in yeast and bacteria
- Pyruvate is changed to ethyl alcohol (ethanol)
- Also produces CO<sub>2</sub>
  - That's the bubbles!