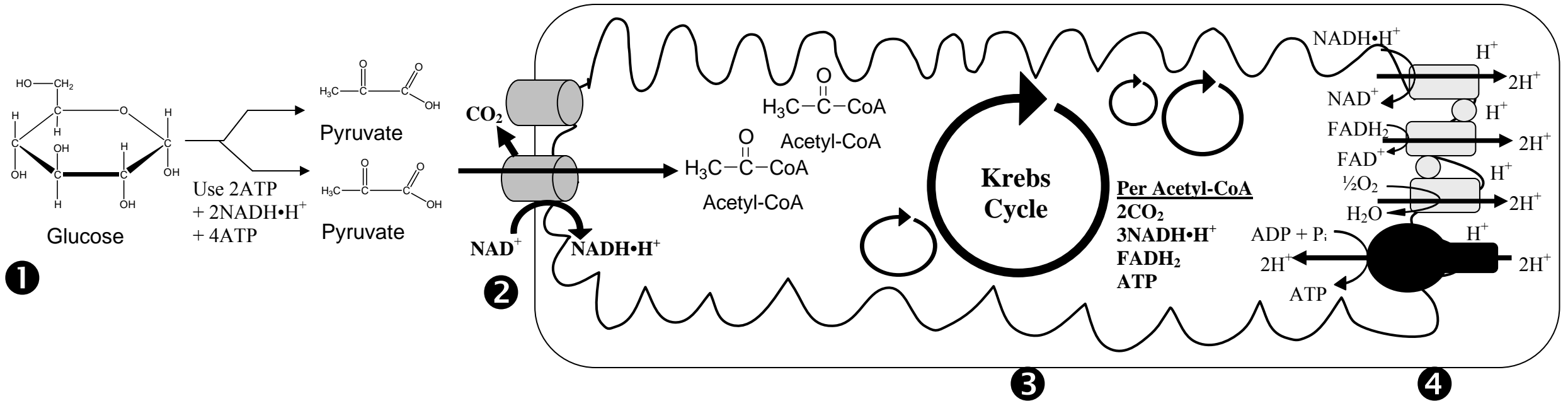


Cellular Respiration: $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$



1 Glycolysis

Occurs in the cytosol

1 six-carbon glucose is broken into 2 three-carbon pyruvates.

2 ATP are used to start the reaction.

2 NADH•H⁺ are formed
4 ATP are formed (giving a net of 2 ATP)

Note: In eukaryotes, the electrons from the 2 NADH•H⁺ are shuttled across the mitochondrial membrane to 2 FADH₂. This reduces the total ATP yield by two.

2 Transport into the Mitochondria

Occurs at the mitochondrial membrane

A three-carbon pyruvate is converted into a two-carbon acetyl-CoA. The third carbon is lost as carbon dioxide.

1 NADH•H⁺ is formed for each pyruvate.

(2 NADH•H⁺ are formed for each glucose)

3 Krebs Cycle

Occurs in the mitochondrial matrix

Each two carbon acetyl-CoA is added to the Krebs cycle; both carbons are eventually lost as carbon dioxide.

Yield per Acetyl-CoA

3 NADH•H⁺

1 FADH₂

1 ATP

(6NADH•H⁺, 2FADH₂, and 2ATP are formed for each glucose)

4 Electron Transport Chain (ETC)

Occurs in the inner mitochondrial membrane and the intermembrane space.

The ETC has 3 proton pumps, each with the ability to pump out 2 protons/cycle.

NADH•H⁺ interacts with all 3 pumps, moving a total of 6 protons

FADH₂ interacts with 2 pumps, moving 4 protons.

Protons return to the matrix through the F₁F₀ ATP synthase. One ATP is made for every two protons that flow through.