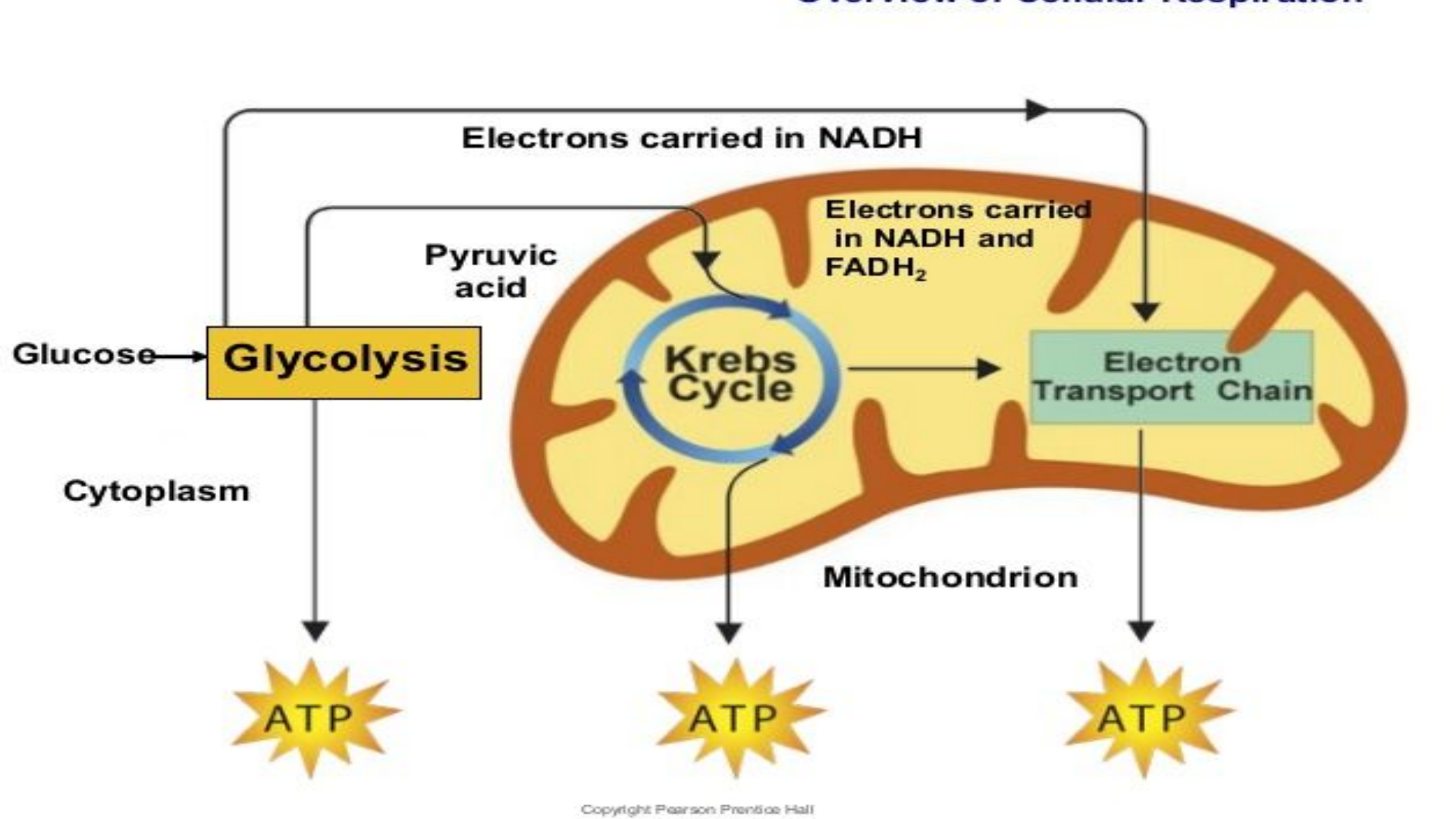


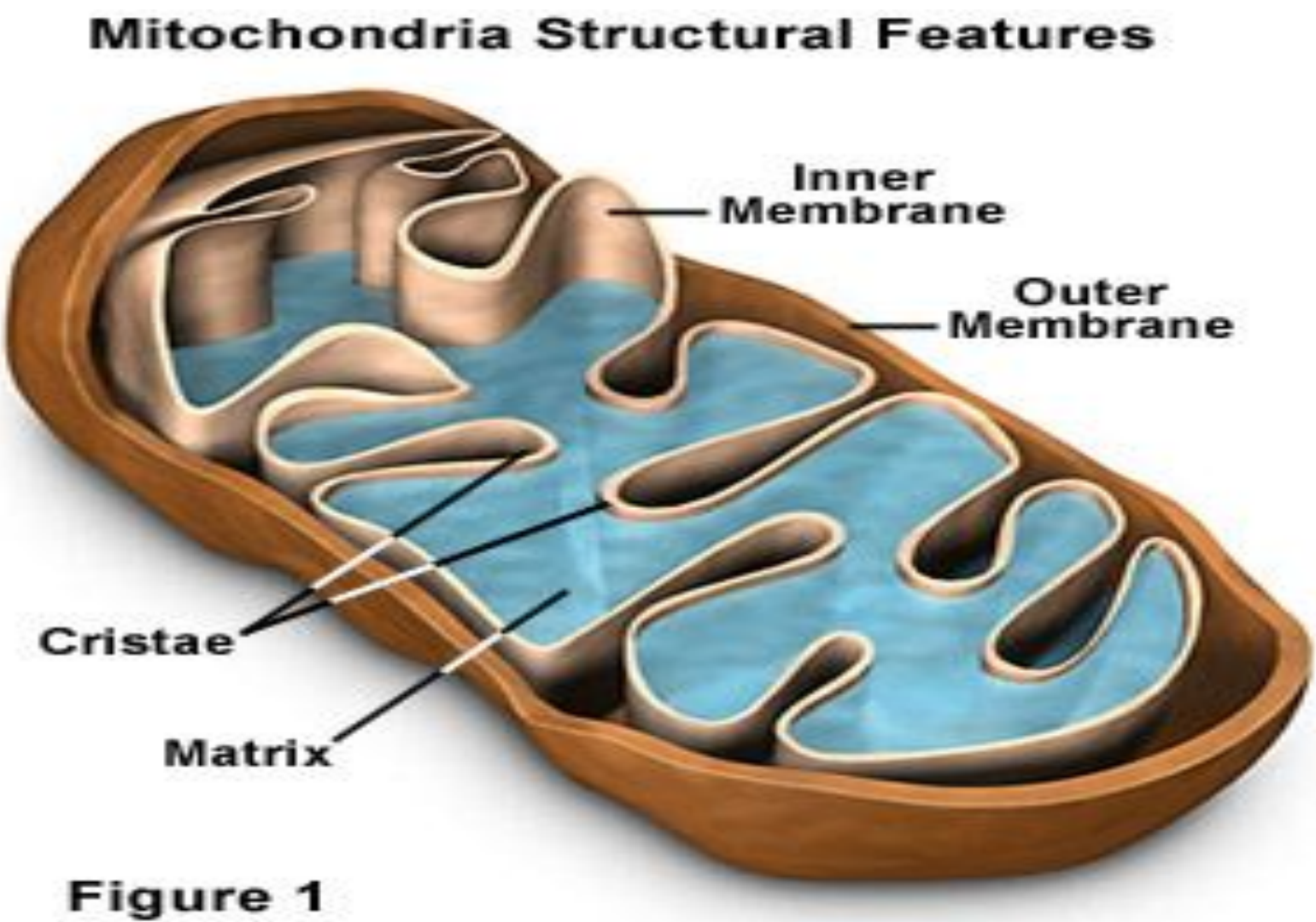
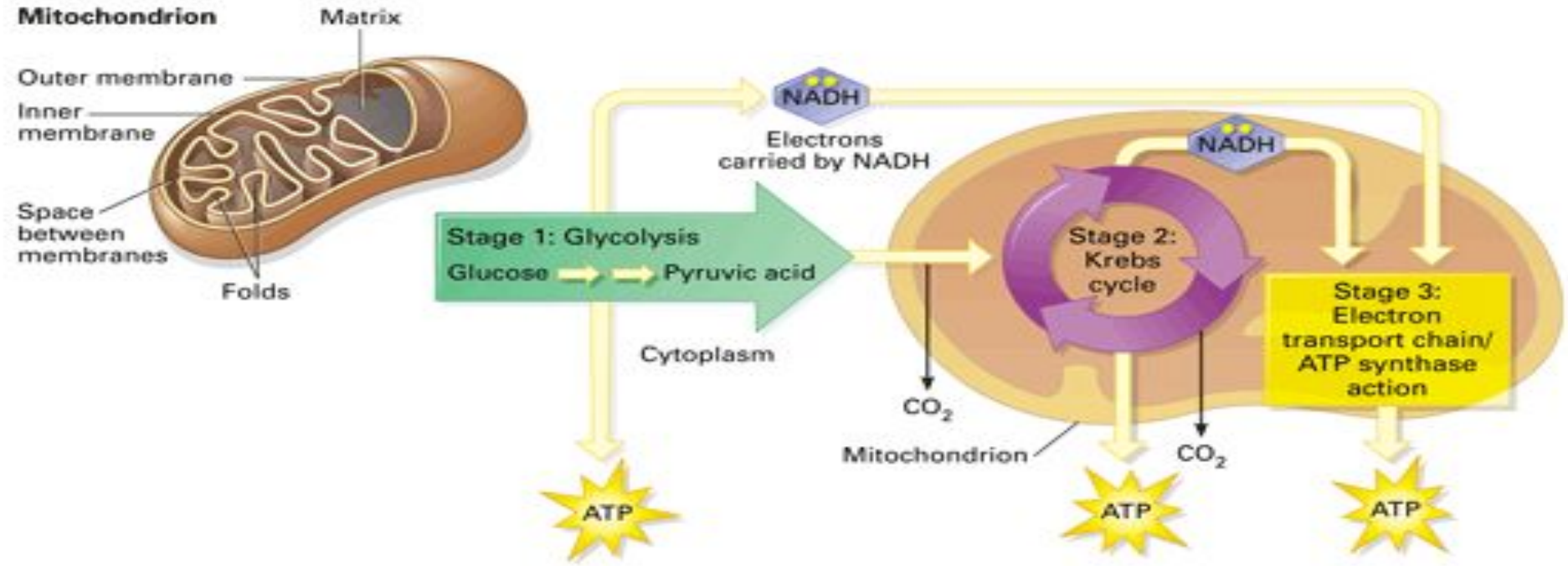

Mitochondria Structural Features
Inner Membrane
Outer Membrane
Cristae
Matrix

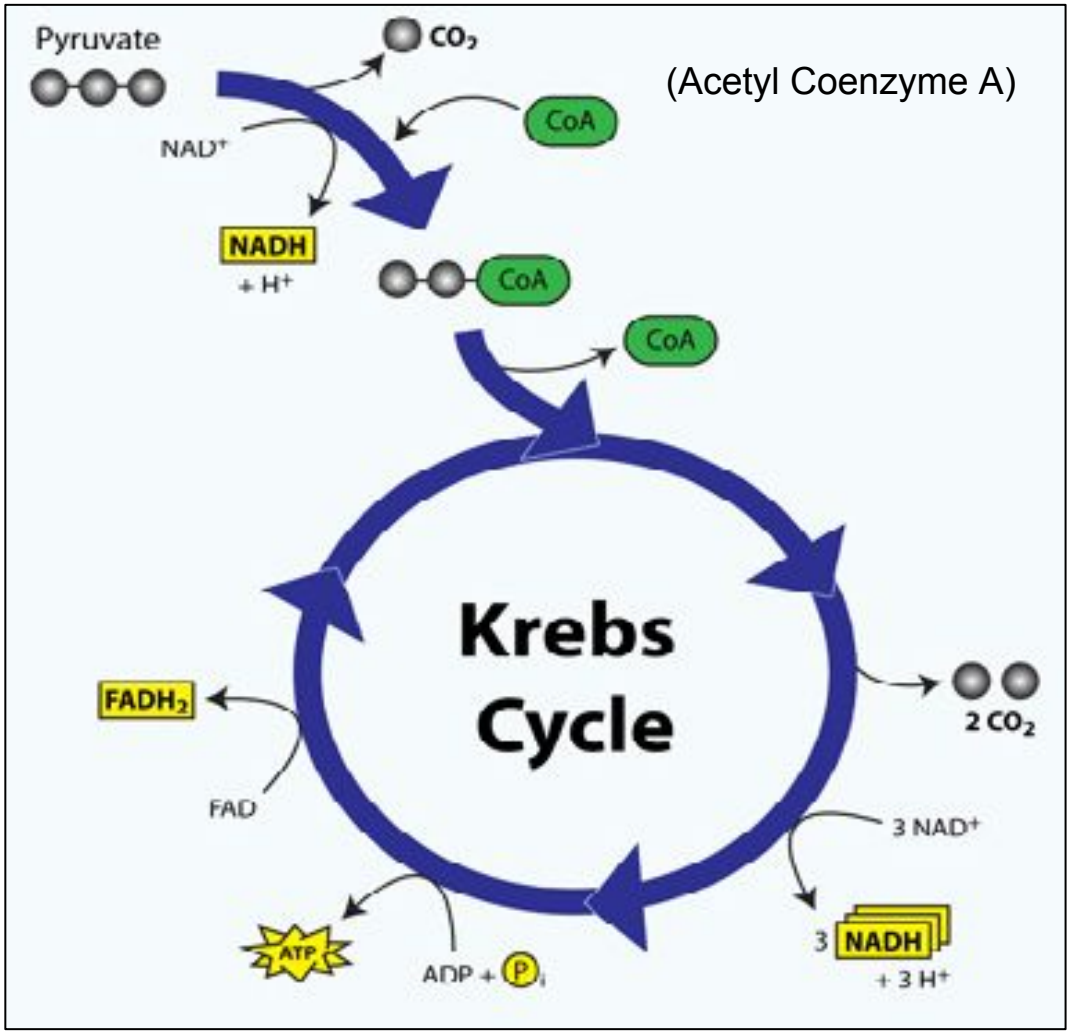
Figure 1

Step 2➔ The Krebs Cycle (Citric Acid Cycle)

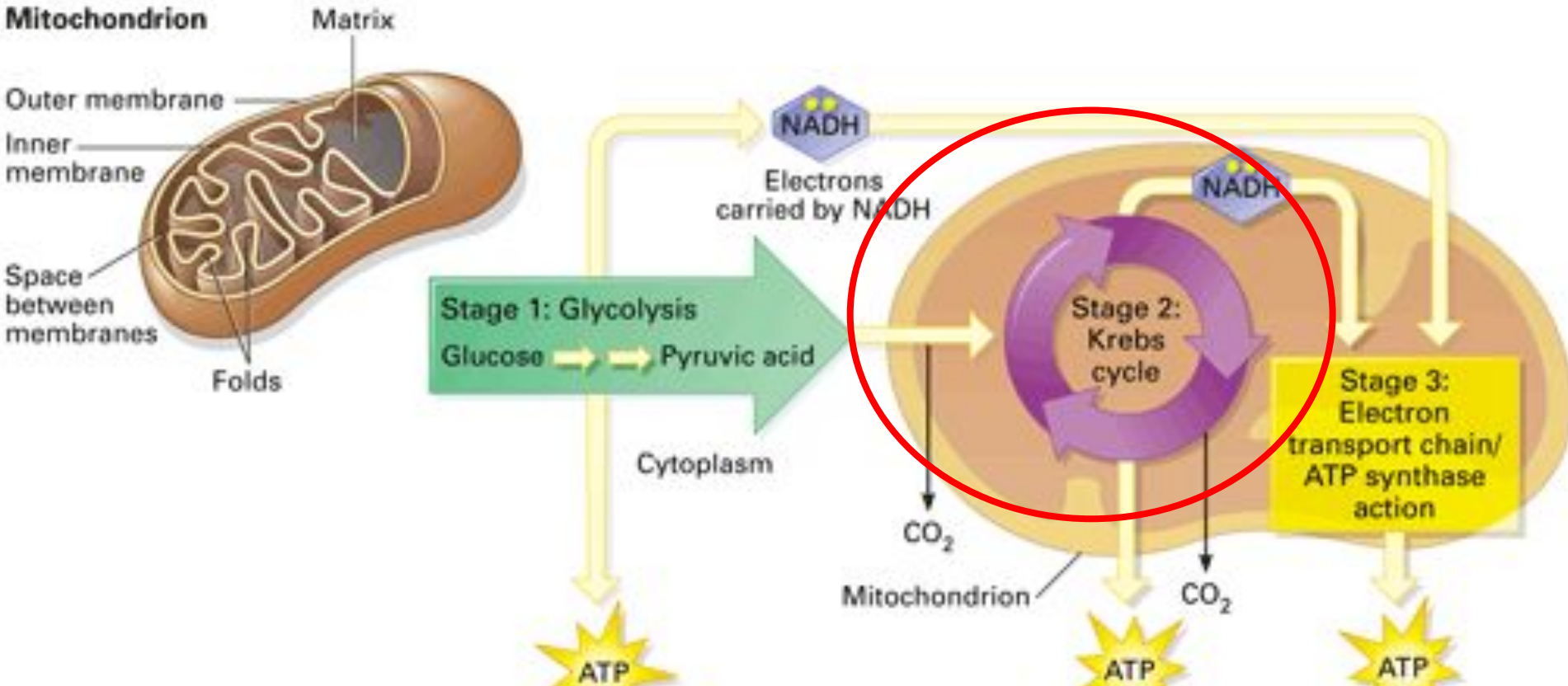
<u>the Krebs cycle</u>: the second stage of respiration will use the pyruvic acid formed in glycolysis to produce ATP, NADH, and CO_2 (as a waste product)



The Krebs cycle is named after Hans Krebs, a British biologist who discovered its existence in 1937.



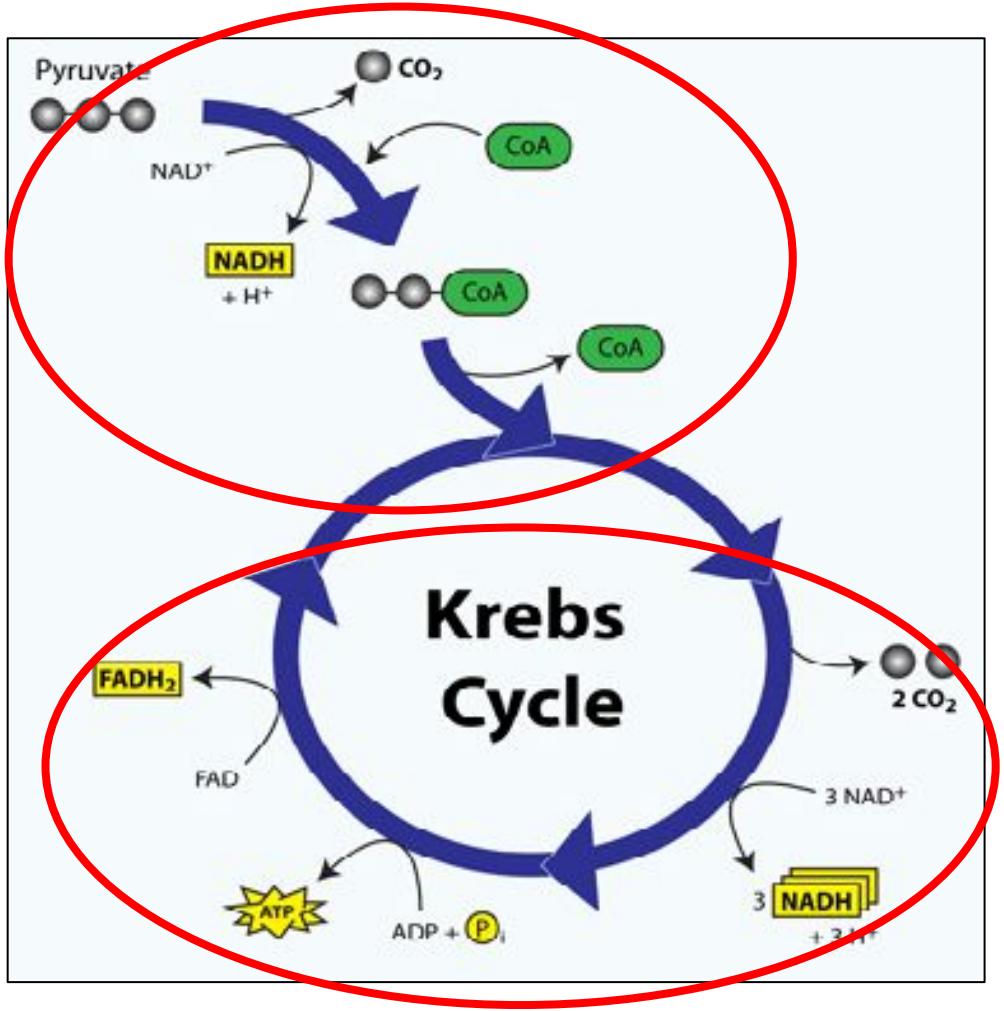
During the Krebs cycle, pyruvic acid is broken down into carbon dioxide in a series of energy-extracting reactions.



Step 1: 1 carbon atom from pyruvic acid gets released into the air.
The other 2 carbon atoms are joined to a compound called coenzyme A to form acetyl-CoA.

Acetyl-CoA then adds 2 carbon acetyl groups to a 4 carbon molecule producing a 6 carbon molecule called citric acid

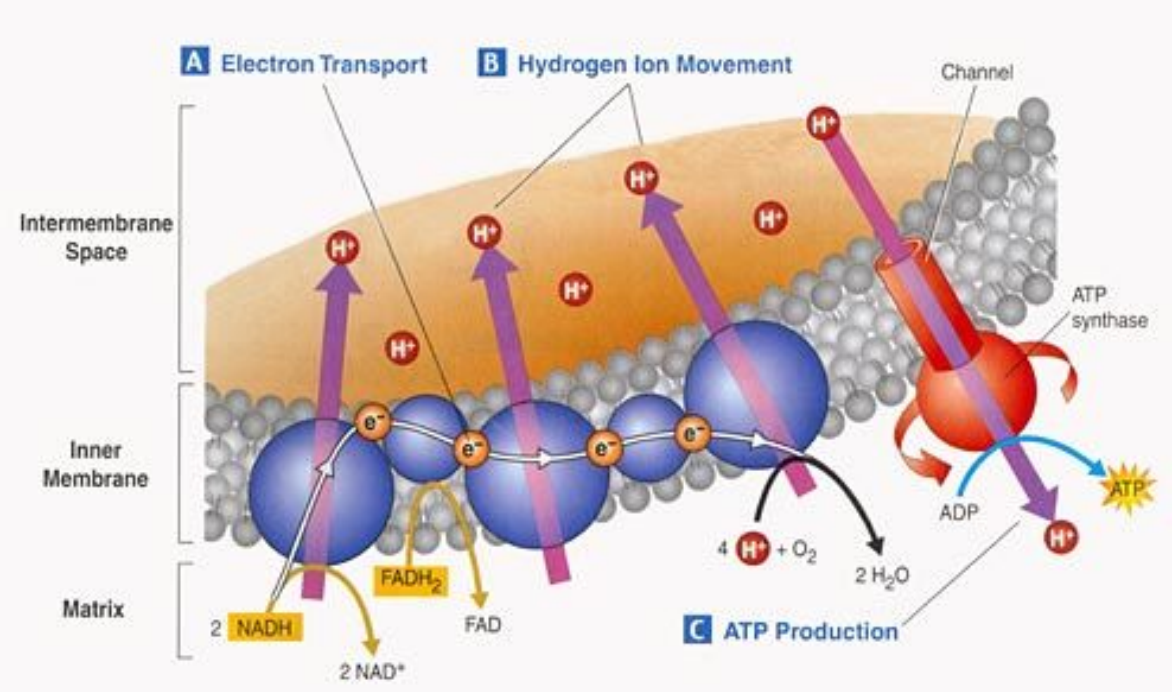
Step 2: Citric acid is broken into a 5 carbon compound, and then into a 4 carbon compound, releasing electrons to high-energy electron carriers and creating ATP along the way

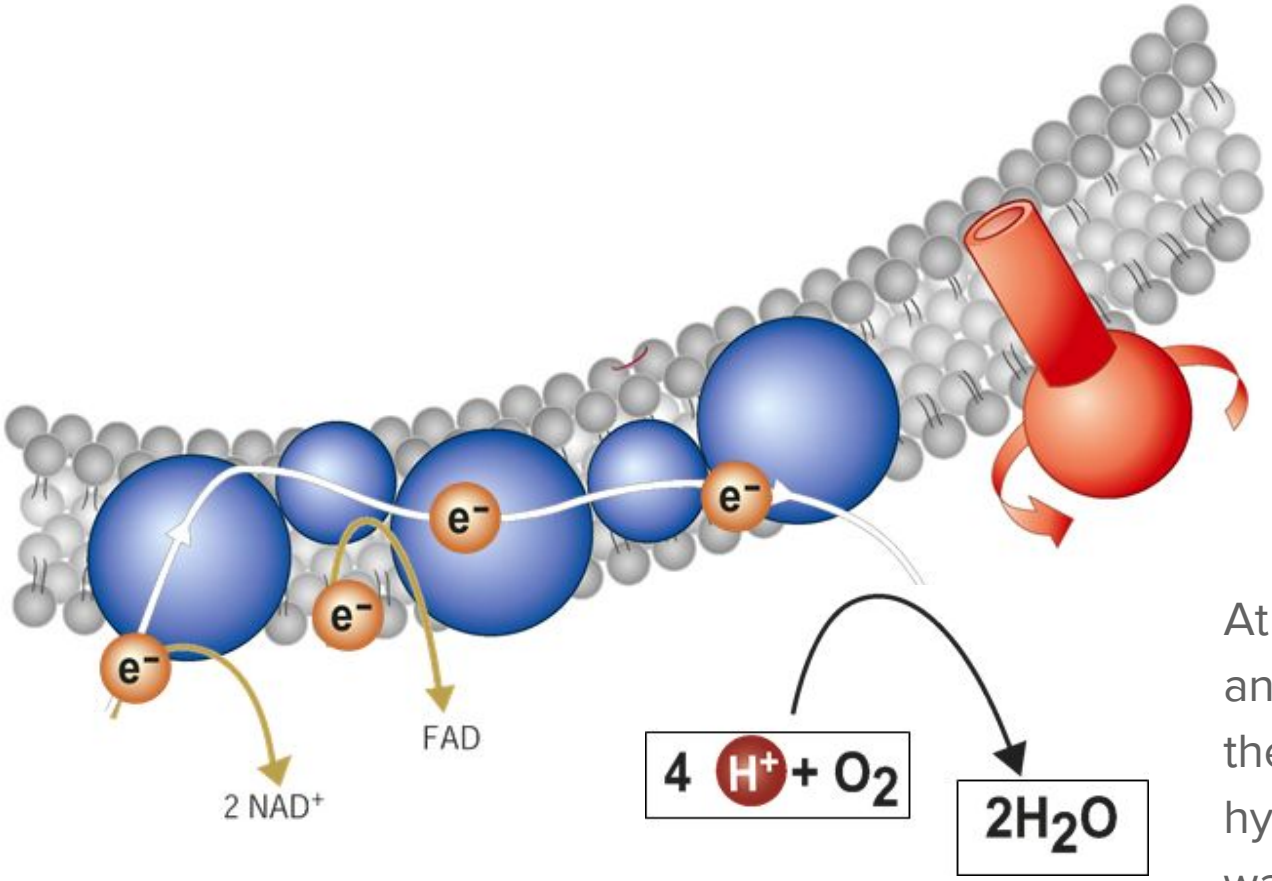


Step 3➔ The Electron Transport Chain

High energy electrons produced in the Krebs cycle are transported by NADH and $FADH_2$ to the electron transport chain in the matrix membrane.

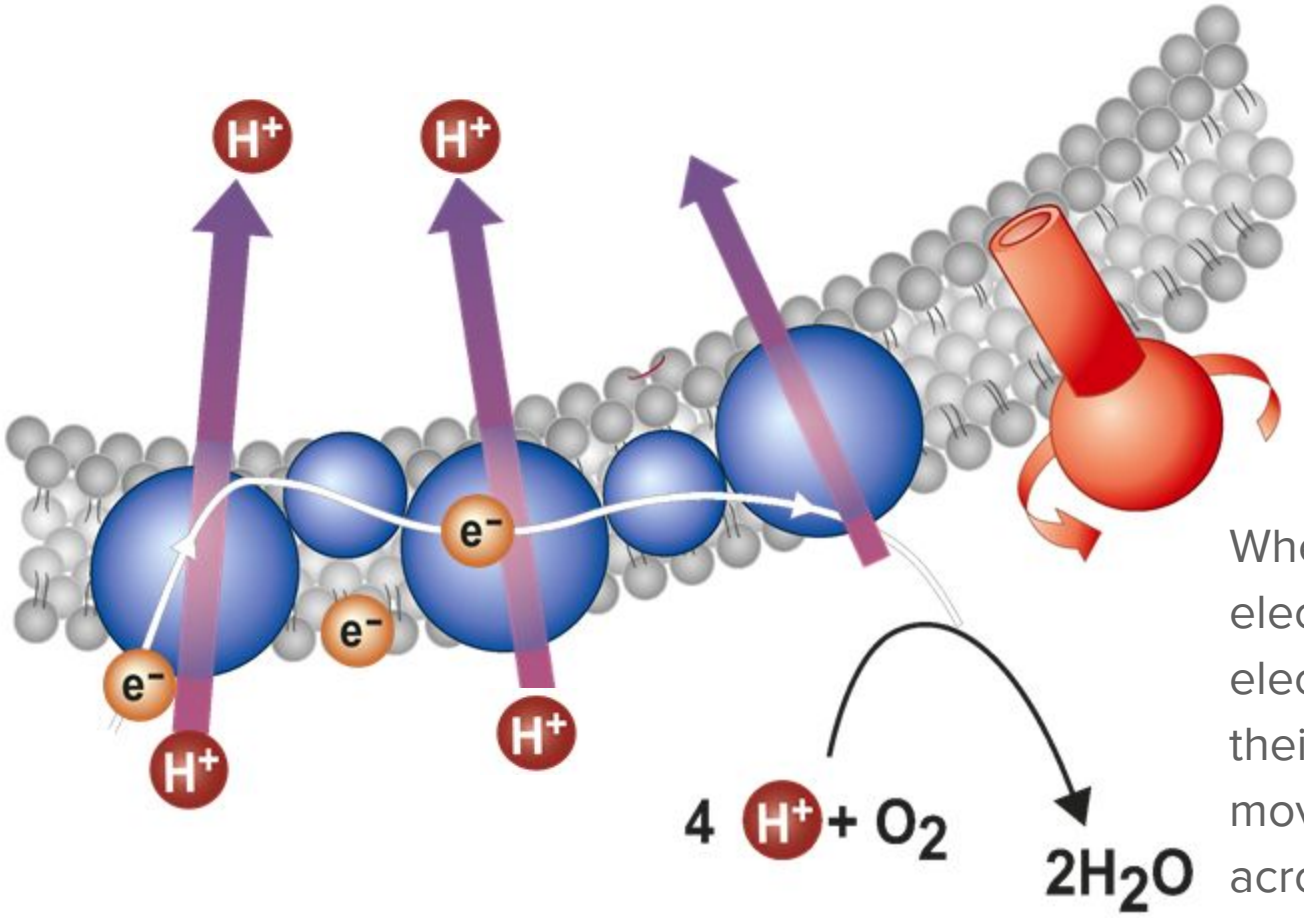
The electron transport chain uses the high-energy electrons to convert ADP to ATP.



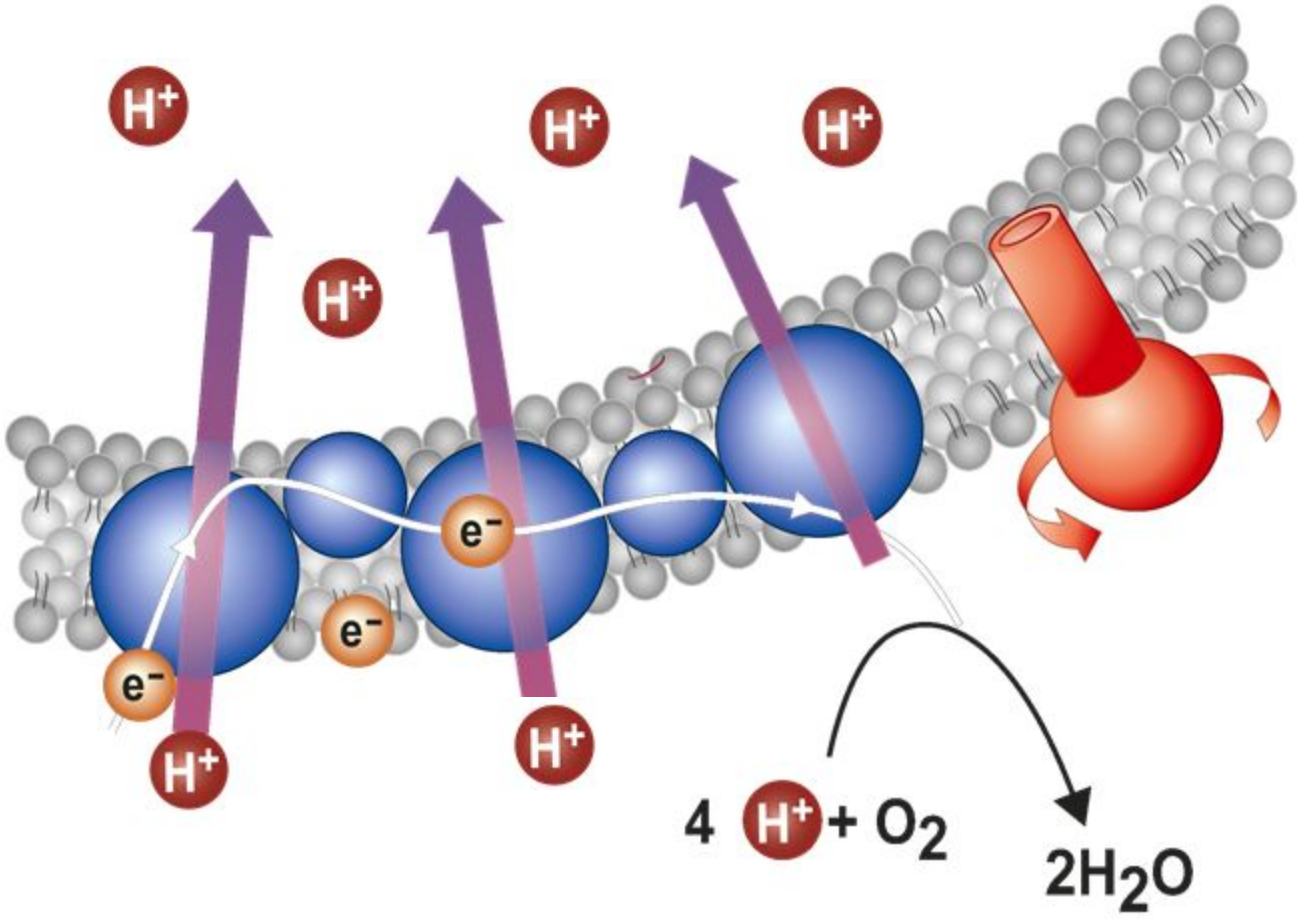


High energy electrons are passed from one carrier protein to the next.

At the end of the chain, an enzyme combines these electrons with a hydrogen ion to form water.

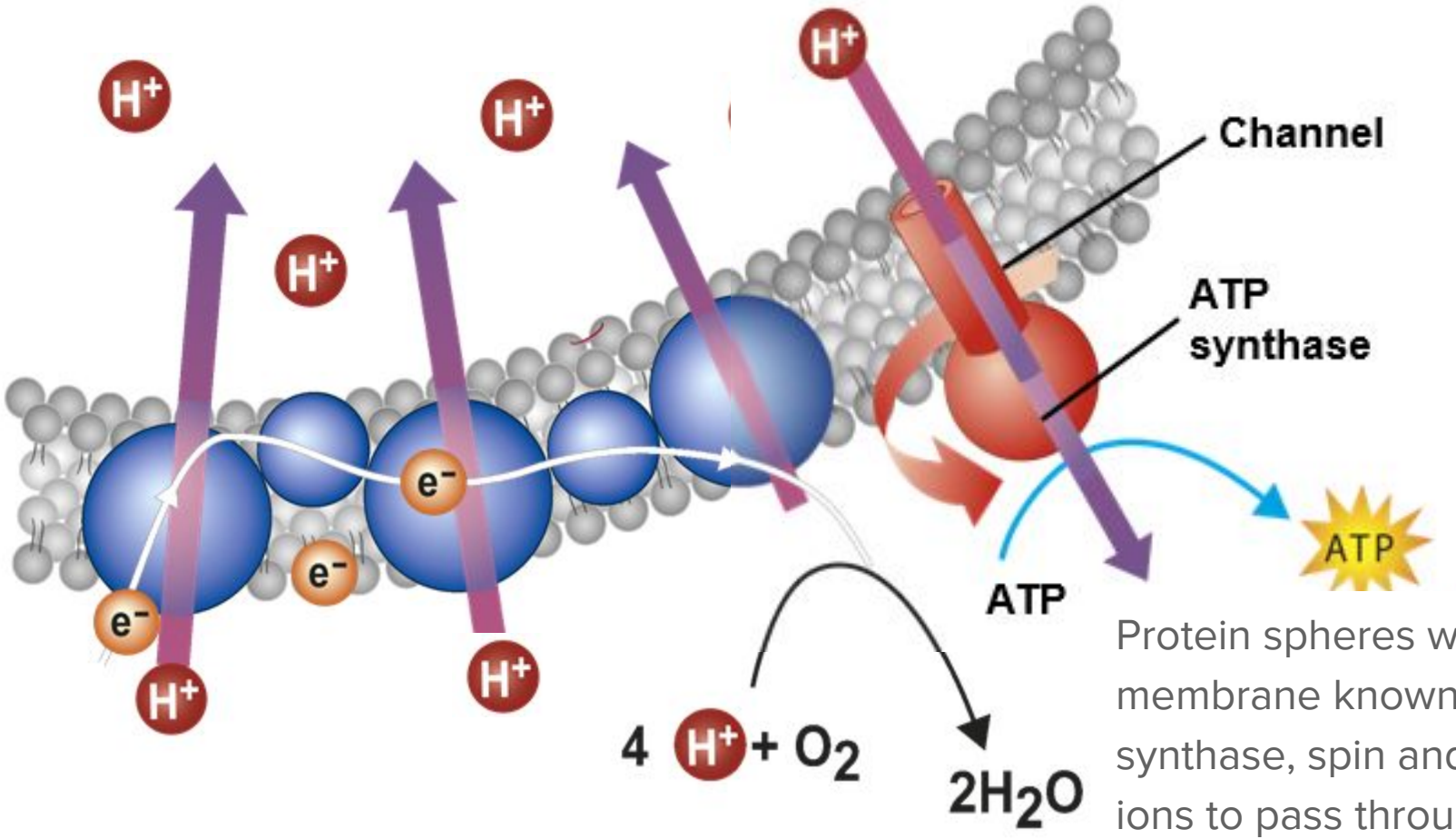


When 2 high energy electrons move down the electron transport chain, their energy is used to move hydrogen ions across the membrane.



During electron transport, H+ build up in the intermembrane space and it becomes positively charged.

This makes the outside negatively charged as the H+ ions are removed.



Protein spheres within the membrane known as ATP synthase, spin and allow H+ ions to pass through its channel, making ATP!

Glycolysis produces only 2 molecules of ATP per molecule of glucose

The complete breakdown of cellular respiration results in the production of **36 molecules** of ATP.

This represents about 38% of the total energy of glucose.