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

Because the first compound formed in this series of reactions is citric acid, the Krebs cycle is also known as the citric acid cycle.

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The energy tally from one molecule of pyruvic acid is:

4 NADH
1 $FADH_2$
1 ATP

The ATP directly produced from the Krebs cycle can be used for cellular activities.

What happens to the high-energy electrons stored in NADH and $FADH_2$?

Electron Transport - Figure 9-7 (Page 228)

The third stage of cellular respiration takes place within the inner mitochondrial membrane.

The electron transport chain uses the high-energy electrons from the Krebs cycle to convert ADP into ATP.

A High-energy electrons from NADH and $FADH_2$ are passed along the electron transport chain. At the end of the chain is an enzyme that combines these electrons with hydrogen ions and oxygen to form water.

B Every time 2 high-energy electrons transport down the electron transport chain, their energy is used to transport hydrogen ions across the membrane into the intermembrane space making it positively charged. The other side of the membrane becomes negatively charged.

C H^+ ions escape from the intermembrane through channels in ATP synthase. ATP synthase spins. Each time it does, it grabs a low-energy ADP and attaches a phosphate forming high-energy ATP.

Energy Totals

Cellular Respiration

Glycolysis	2 ATP per glucose molecule
Krebs Cycle + Electron Transport	34 ATP per glucose molecule
Total	36 ATP per glucose molecule

Comparing Photosynthesis and Cellular Respiration

Figure 9-10

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	Photosynthesis	Cellular Respiration
Function	Energy capture	Energy release
Location	Chloroplasts	Mitochondria
Reactants	CO_2 and H_2O	$C_6H_{12}O_6$ and O_2
Products	$C_6H_{12}O_6$ and O_2	CO_2 and H_2O
Equation	$6CO_2 + 6H_2O \xrightarrow{\text{Energy}} C_6H_{12}O_6 + 6O_2$	$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + \text{Energy}$

endergonic reaction

exergonic rxn

Attachments

Two_Types_of_Cells__Prokaryotic_and_Eukaryotic.asf

Bacteria.asf