

### The Cellular Respiration Story

Use these terms to fill in the blanks. The terms can obviously be used more than once.

NADH	FADH <sub>2</sub>	FAD <sup>+</sup>
electrons	matrix	mitochondrion
hydrogen ions (H <sup>+</sup> )	protons	Rotenone
electron transport system(ETS)	inner mitochondrial membrane	NAD <sup>+</sup>
intermembrane space	oxygen (O <sub>2</sub> )	gradient
ATP synthase	channel	P
enzyme	ADP	ATP

\_\_\_\_\_ and \_\_\_\_\_ are energy carriers that also carry \_\_\_\_\_ and \_\_\_\_\_, which are equivalent to \_\_\_\_\_, to the \_\_\_\_\_, which is composed of a series of proteins located in the inner mitochondrial membrane. The proteins serve as a series of electron carriers that accept the \_\_\_\_\_ from the \_\_\_\_\_ and \_\_\_\_\_ and pass them along from one to another. The movement of the \_\_\_\_\_ through the \_\_\_\_\_ provides the energy needed to pump \_\_\_\_\_ (or protons) supplied by the \_\_\_\_\_ and \_\_\_\_\_ or from the \_\_\_\_\_ (the center of the mitochondrion) through the \_\_\_\_\_ into \_\_\_\_\_ (the space between the inner and outer membranes of the mitochondrion). This results in a higher concentration of \_\_\_\_\_ in the \_\_\_\_\_ than in the \_\_\_\_\_. When the \_\_\_\_\_ reach the last electron carrier, they are picked up by an \_\_\_\_\_ atom (which is typically represented as 1/2O<sub>2</sub>), which acts as the final electron acceptor and combines with two \_\_\_\_\_ to form H<sub>2</sub>O. This last step also contributes to the difference in the \_\_\_\_\_ concentration on either side of the inner mitochondrial membrane. Besides the proteins that make up the \_\_\_\_\_, there are also \_\_\_\_\_ molecules in the inner mitochondrial membrane. These proteins serve as both a \_\_\_\_\_ that allows the \_\_\_\_\_ to pass through and as the \_\_\_\_\_ (i.e. a protein that serves as a catalyst and speeds up a reaction) that catalyzes the manufacture of \_\_\_\_\_ from \_\_\_\_\_ and \_\_\_\_\_. The energy used to form the bond between the \_\_\_\_\_ and \_\_\_\_\_ to form \_\_\_\_\_ is provided by the movement of the \_\_\_\_\_ through the \_\_\_\_\_ along the \_\_\_\_\_ formed because of the difference in concentration of hydrogen ions on either side of the inner mitochondrial membrane. This process forms the majority of the \_\_\_\_\_ produced by cellular respiration. To provide a large surface area for this to take place in the small volume of the mitochondrion, the \_\_\_\_\_ is highly folded and projects into the \_\_\_\_\_ in finger-like projections called \_\_\_\_\_. When the \_\_\_\_\_ and the \_\_\_\_\_ release their hydrogen ions and electrons they become \_\_\_\_\_ and \_\_\_\_\_ again. The \_\_\_\_\_ and \_\_\_\_\_ are free to return and pick up more hydrogen ions and electrons. So too, as \_\_\_\_\_ molecules are used to provide energy to other reactions, they are broken down into \_\_\_\_\_ and \_\_\_\_\_ which can be assembled into \_\_\_\_\_ again. The movement of the hydrogen ions, NADH, FADH<sub>2</sub>, O<sub>2</sub>, H<sub>2</sub>O, ADP, etc. occurs concurrently (i.e. there is a constant and continuous level of activity). If an inhibitor, such as \_\_\_\_\_, were to block one of the electron transport proteins, the whole process would stop and no \_\_\_\_\_ would be produced in the \_\_\_\_\_. This could also happen if the \_\_\_\_\_ molecules were blocked or if the inner mitochondrial membrane were torn or become very permeable to hydrogen ions and reduced the number passing through the ATP synthase or made the \_\_\_\_\_ disappear.

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