

# The mitochondria



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Mitochondria (plural Mitochondrion) are components of cells that generate respiratory processes and considered to be one of the most significant organelles. The mitochondria can be found in most eukaryotic cells (cells containing intricate structures), such as animal cells, plant cells, fungal cells, etc.

The structure of mitochondria is usually that of an oval. Mitochondria organelles range from sizes 0.5 to 10 micrometers ( $\mu\text{m}$ ) in diameter. The structure of the mitochondria is much more complex than other cells as it has both an inner membrane, inter-membrane and an outer membrane. The outer membrane is simply the shell that encases everything inside.

The inter-membrane is the space in between the outer and inner membrane. The inner membrane is the segment of the mitochondria which contains all the important components which allows for the organelle to function efficiently. The most important components found in every mitochondrion are:??? Cristae??? Matrix??? Mitochondrial Ribosome??? ATP (Adenosine Triphosphate) Synthase Particles (after production of ATP)??? Mitochondrial DNA (Deoxyribonucleic Acid)The inner membrane plays a significant role in the functioning of the mitochondria as it contains the components to carry out respiration.

Each component carries out five various functions, which include:??? Performing redox (reduction-oxidation) reactions of oxidative phosphorylation (chemical reaction in which atoms have their oxidation number changed).??? ATP synthase (generating ATP in the matrix)??? Transport proteins that regulate metabolite passage into and out of the

matrix.??? Protein import machinery.??? Mitochondria fusion and fission protein. The shape of the Crista (plural Cristae) in the inner membrane of the mitochondria maximizes the surface area of the inner membrane (by upto five times that of the outer membrane) to help facilitate significant chemical reactions such as Electron Transport Chain and the production of Adenosine Triphosphate (ATP). The Matrix is the space enclosed in the inner membrane where the production of ATP occurs and plays an integral role in its production with assistance from ATP synthase.

The matrix contains heavily concentrated mixture of hundreds of enzymes, mitochondrial ribosomes, tRNA (Transfer Ribonucleic Acid) and several duplications mitochondrial DNA. The mitochondrion has many functions the most prominent of them all being the production of ATP and the regulation of cellular metabolism. Other functions accomplished by the mitochondria include:??? Energy conversion (oxidizing the major products of glucose, pyruvate, and NADH to create ATP)??? The Citric Acid Cycle??? The Electron Transport Chain??? Heat Production??? Storage of Calcium Ions??? Regulation of the membrane potential ??? Apoptosis-programmed cell death ??? Calcium signaling (including calcium-evoked apoptosis) ??? Cellular proliferation regulation??? Regulation of cellular metabolism ??? Certain heme synthesis reactions ??? Steroid synthesis. The mitochondrion is the powerhouse of cells, as it withholds all the important nutrients and energy and creates respiration to aid function a cell. Hence why a cell needs this organelle, as it is the heart of cells, pumping nutrients and energy into the cell.